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Popkin Software & Systems

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POPKIN SOFTWARE
& SYSTEMS, INC.
SYSTEM ARCHITECT™

Popkin Software & Systems provides affordable PC-based CASE (Computer-aided Software Engineering) tools for designing client/server, as well as conventional mainframe data processing and real-time systems. System Architect, Popkin's flagship product, supports business process definition, data modeling, database design and screen creation.

1. Description of Principal Business

Popkin Software & Systems is a privately-held emerging software vendor. It is self-funded and its revenues are shown below.

2. Organization

Popkin Software was founded in 1986 by Jan Popkin, a system architect with experience in large-scale imaging and transportation systems, and Ronald Scherma, a former VP of Bradford Systems with extensive high technology management experience. Popkin is investing more than 30% of its revenues in R&D as it continues to develop more products.

Exhibit 1

Popkin Software Revenues
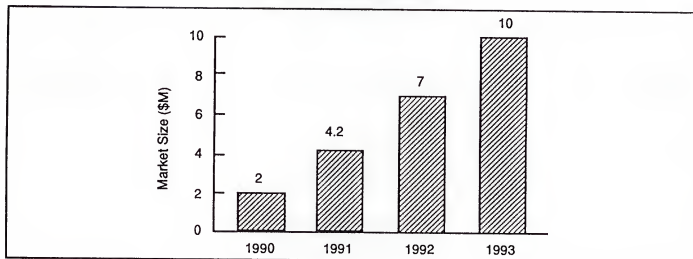
3. Client/Server Products and Services

System Architect, an OS/2 and MS Windows-based computer-aided software engineering (CASE) system, supports design of databases, object-oriented systems and GUI screens. Competitive pricing starts at $1395 for a single-user version and $1545 for a networked version running under Windows.

Support for flow charts, entity-relationship diagrams, Yourdon/DeMarco, Gane & Sarson, Ward-Mellor and Schlaer-Mellor system design methodologies give System Architect capabilities found in much higher-priced systems. Recently, Popkin announced its support of the OMT/Rumbaugh object-oriented analysis and design methodology. This brings the total of object-oriented techniques supported to four, more than any other comparable design tool.

Optional modules are:

- *SA Screen Painter* ($495) for designing graphic and character-based screens that can be incorporated in a Windows or COBOL application

- *SA Schema Generator* ($795) for generating triggers for Microsoft's SQL Server. It also generates DDL (Data Definition Language) to communicate with Oracle, Ingres, Informix, Progress, Paradox, dBase, DB2, Sybase and other SQL and 4GL databases.

- *SA Object* ($495) supports Booch 91 and Coad/Yourdon object-oriented design methodologies.

- *SA Reverse Data Engineer* ($795) enables diagrams to be drawn from existing SQL databases. This enables System Architect to change its design when a database is modified, thereby ensuring design integrity.

- *SA Project Documentation Facility* ($1395) is a report writer that creates requirements, design and system-level documentation from information in the SA data dictionary/encyclopedia. It meets federal documentation requirements. It has its own font support to give publication quality output. Word processors, editors and desktop publishing packages may also be used to further enhance the reports.

- *SA PowerBuilder/Link* ($1995) allows the exchange of information between Powersoft's PowerBuilder C/S development tool and System Architect.

- *SA SQL Windows/Link* ($na) allows the exchange of information between Gupta's SQL Windows GUI development tool and System Architect.

In addition to the above, the main features of System Architect are:

- Multilevel network security

- Access control to repository objects

- IDEF0 and IDEF1X compatibility

- Real-time modeling

- Database browser

4. Client/Server Strategy

Popkin's goal is to make a range of high-performance CASE tools at affordable prices.

By interfacing System Architect to leading C/S tools like PowerBuilder and SQL Windows, Popkin is able to compete successfully with more expensive tools in the mainframe and workstation arena. In contrast to mainframe I-CASE (integrated CASE) products like IBM's AD/Cycle that have not been quickly adopted, System Architect has been well-received.

Although System Architect resides on a PC network, it can access data dictionaries and databases on a server provided the underlying network supports remote file access.

5. Marketing & Distribution

Popkin apportions its software through a network of distributors. The company also sells direct to major corporations and system integrators. As the product becomes more well-known, one can expect more distribution through other C/S vendors, consultants and value-added resellers.

INPUT's 1993 estimate for the worldwide CASE market is $840 million. This includes both upper- CASE system design tools and lower-CASE compilers, workbenches and debuggers. INPUT believes that over the next five years, the PC and workstation part of the market will grow, whereas, the mainframe market will decline significantly.

6. Customers

Popkin reports sales of 20,000 copies of System Architect worldwide. In some cases there are two to three users per copy, making the total number of users

Exhibit 2

System Architect Modules
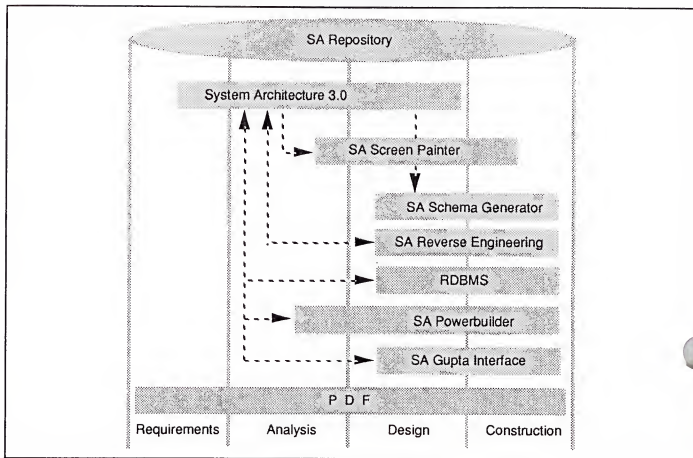
closer to 40,000. Customers include Amoco, AT&T, American Airlines, Dun & Bradstreet, Westinghouse, Siemens, IBM, Data General and others.

7. Partners, Alliances, Ventures

Popkin has joint-marketing arrangements with Powersoft, Gupta Corporation, IBM Japan and Progress Software. This well positions Popkin as a versatile tool that works with leading database application building software.

8. Financial Estimates

Popkin estimates its annual growth rate over the last four years is 75% per annum on average. Its 1993 revenues were $10 million worldwide.

9. Competitive Position

The CASE market is crowded. However, Popkin has managed to differentiate itself from competitors by emphasizing public relations, building full-featured software and keeping the entry price affordable.

There are many CASE vendors. The main competitors for enterprise markets:

- Intersolv - Excelerator
- LBMS - Systems Engineer
- Knowledgeware - IEW and ADW
- Texas Instruments - IDEF
- Bachman Information Systems

Before Index Technologies merged into Intersolv, Excelerator could have been a serious threat to System Architect. However, because Intersolv had other products to sell, Excelerator lost momentum, enabling Popkin to gain sales.

LBMS's Systems Engineer is priced considerably higher than System Architect, at present, with a starting price of $5000. Knowledgeware, TI and Bachman are all moving strongly into the client/server market with industrial strength systems and experienced sales teams. Popkin realizes it has to invest heavily in new features to keep ahead on the price/performance curve.

There are many other competitors, such as the following, that are strong in the UNIX workstation market:

- CADRE Technologies - Teamwork
- IDE - Software Through Pictures

By increasing market share on the Windows platform, Popkin minimizes the risk that UNIX workstation CASE tool vendors will encroach on its markets.

10. INPUT Assessment

Popkin has realized its vision of offering affordable CASE technology on Windows and OS/2. System Architect is excellent value for information systems departments, software engineering teams, system integrators and independent system consultants. It is suitable for both large and small companies to organize their data and business processes. It is also useful as an educational tool to teach the principles of software engineering.

Product strengths are:

- Wide-range of supported methodologies
- Flexible data dictionary interfaces
- Ability to diagram relationships in existing databases, using reverse engineering module
- Compatibility with databases, COBOL screens and Windows programming environments
- Good price performance
- Easy to install and learn

The user interface for SA 3.0 has been upgraded to make it easier to use. Screen design has been improved and the package more closely follows standards for screen design found in other Windows applications.

Strengths of Popkin's market approach are:

- Ability to leverage relationships by interfacing software to products from market leaders such as Powersoft and Gupta

- Excellent use of public relations

- High quality accounts and satisfied customers

Risks in Popkin's market approach are:

- Users prefer not to plan their systems in detail. Instead, they find C/S tools so easy to use and so reliable, they see no need for upfront design.

- Microsoft and Borland develop integrated development workbenches (beyond Visual C++ and Borland C++) that include CASE tools other than Popkin's.

- Popkin's price is too high and another vendors enter the market with mass-market distribution through mail-order and superstores. Competitors lower prices.

- Database and application development tool vendors supply CASE tools that are superior to Popkin's at lower prices.

The risk of the last scenario is low. Database vendors and workbench vendors provide CASE tools, but are not perceived as having the flexibility of a tool from an independent vendor. Also, where application development tool vendors have integrated CASE tools with their products, they typically offer a range of tools, thereby offering Popkin a distribution channel.

SA is a professional tool. Entrants in the low-end market are not perceived as competition. Popkin views the SA market as a highly specialized segment that is different from the mass market for system diagramming tools.

INPUT tested System Architect on a 486-based PC running with 16MB memory. Whereas System Architect runs on a standard PC with 4MB of RAM and 10MB of disk space, a more powerful machine is recommended. For any PC-based data analysis application, fast disk access and Pentium processors are recommended for full-time users. A dual page monitor is recommended for displaying system diagrams clearly.

In summary, System Architect is a useful product for system integrators, software developers and process re-engineering consultants. Its success will depend on how well it can adapt to different software management cultures.

With its support for different methodologies, a range of C/S tools and excellent price/performance, Popkin should continue to grow.

Company Profile

ParcPlace Systems

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ParcPlace®

ParcPlace develops and markets client/server (C/S) application development tools. This profile describes the company, its flagship product, VisualWorks, and its market position.

1. Description of Principal Business

A pioneer in the Smalltalk programming language, ParcPlace's mission is to sell object-oriented development environments for mainstream corporate computing.
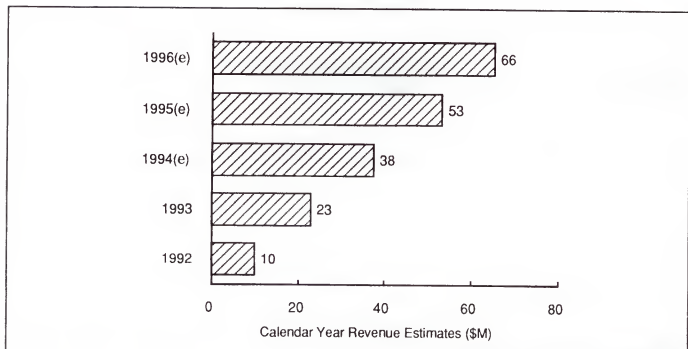
ParcPlace distributes directly and indirectly through computer manufacturers, system integrators and value-added resellers. In early 1994 the company had a successful initial public offering.

2. Organization

Founder Adele Goldberg is one of the Smalltalk pioneers at Xerox. She is a highly respected technical visionary and chairman of the board. In 1988 several of her Smalltalk development team left Xerox's Palo Alto Research Center (PARC) to form ParcPlace Systems. CEO, William Lyons, has a strong track record, having been vice president of Software Marketing in IBM's National Distribution Division and president and CEO at dBase

Exhibit 1

Revenue Forecast

Year	Revenue ($M)
1996(e)	66
1995(e)	53
1994(e)	38
1993	23
1992	10

Calendar Year Revenue Estimates ($M)

Source: INPUT Estimates, ParcPlace Reports

developer Ashton-Tate. Backgrounds of the experienced management team include Gupta, Informix, Intellicorp and Mead Data Central.

The company's sales operations are divided into North American and International sales. Headquartered in Sunnyvale, CA, ParcPlace has sales offices throughout the U.S. and Europe. Marketing, headed by Richard Dym, is broken down by product line. Smalltalk products are developed in California and C++-based products in a division acquired from Solbourne in Boulder, Colorado.

3. C/S Products and Services

Smalltalk development environments are generating interest because they:

- Simplify complex systems development

- Reduce maintenance costs

- Provide an interactive development environment that can be quickly modified

- Support re-engineering with modular software components

Initial Smalltalk implementations required a workstation. Now Smalltalk performs well on standard PCs.

VisualWorks (entry price $2995 to $4995, single-user depending on platform) creates applications that are portable across leading PC and UNIX platforms.

VisualWorks is visually-based, with "paint and build" screen creation. Its visual user interface supports code reuse and rapid application development. The inheritance feature of an object-oriented language like Smalltalk means that application components like screens and reports can be reused with very little programming.

VisualWorks consists of the following components, shown in Exhibit 2:

• Database Application Creator
• Reusable Application Framework
• Graphical Interface Builder
• Database Connections
• ParcPlace Smalltalk and its tools

VisualWorks runs across multiple platforms, using identical application code. In a traditional application, software developers recompile, relink and debug code for each computing platform. Software libraries for other languages vary on different machines. For a VisualWorks application, a Smalltalk object engine is compiled and installed on each machine. The engine recompiles code and caches it. ParcPlace's Smalltalk engines run on Windows, Windows NT, OS/2, UNIX and MacOS.

VisualWorks provides portability across windowing schemes. The Chameleon View software layer enables a PC developer, creating an application under Microsoft Windows, to see how it would look in an Apple Macintosh or UNIX-based Motif environment with a simple menu selection.

VisualWorks 2.0, announced May 1994, provides significant database interfaces, notably Oracle and Sybase interfaces, that position ParcPlace as a major C/S tool vendor. Microsoft's ODBC API enables VisualWorks to connect to other relational databases. VisualWorks also supports object-oriented database management systems (ODBMSs) using Smalltalk.

ObjectLens enables developers to create database independent interfaces using visual data modeling. It links classes from the object-oriented VisualWorks environment with relations in the database server environment through a common data model. This enables changes in a database schema to be reflected in the visual programming environment. This minimizes the amount of application recoding that needs to be undertaken when a database is modified.

VisualWorks forces software developers to focus on architecture and planning early in the software development cycle. This makes it easier to create robust applications, which in turn reduces development time.

Exhibit 2

Components Of VisualWorks
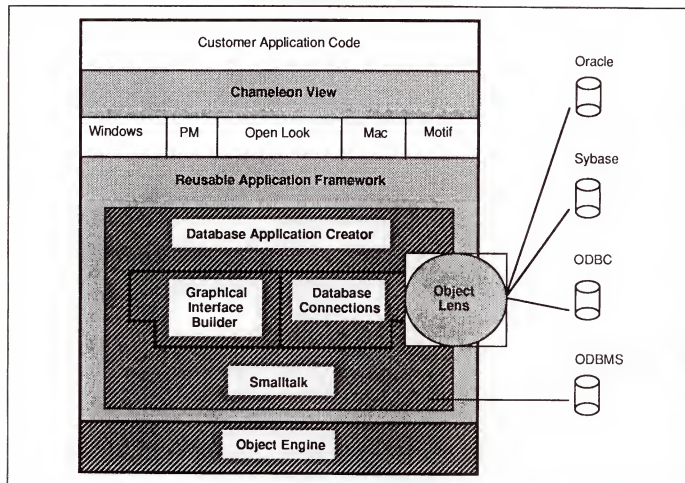
Source: ParcPlace Systems

ParcPlace has dropped its visual development environment for C++, ObjectBuilder, because of increased competition.

ParcPlace offers the following complementary products that are sold as add-ons to VisualWorks:

• VisualWorks ReportWriter

• Advanced Tools

• Dynamic Linked Libraries (DLLs) for Windows

• VisualWorks Database Driver

A programmer can be productive in a week and can master VisualWorks in three to six months. Unlike 4GLs and some other Smalltalk implementations the code generated by VisualWorks is dynamically compiled to increase performance. For some applications, programmers can avoid writing code by using the built-in database interfaces. If

programmers need lower-level functions they have a full range of Smalltalk libraries available.

VisualWorks can be used for different levels of programmers. Experienced system programmers can build objects that less skilled programmers can rapidly customize and integrate. COBOL programmers can easily be retrained to create software using VisualWorks, providing the underlying object framework has been well planned. They usually find it easier to learn the Smalltalk language underlying VisualWorks than C++. It saves them having to deal with memory management, pointers and handles as required in Microsoft's Windows C++ libraries.

ParcPlace's training classes typically last a week and include courses in VisualWorks, Smalltalk, object-oriented programming methodologies and the use of class libraries. COBOL programmers typically learn object-oriented design and analysis, using familiar applications, followed by training in tools and languages.

4. Client/Server Strategy

ParcPlace, having competed successfully in the Smalltalk language market, is now gaining market share in the visual C/S tools market. ParcPlace aims to compete successfully with C/S tools vendors Gupta and Powersoft.

ParcPlace's goals for VisualWorks 2.0 are given in Exhibit 3.

Exhibit 3
Goals For VisualWorks 2.0

- Increase productivity of IS organizations
- Lower C/S software development costs
- Increase the speed of application development
- Improve the quality of C/S applications
- Reduce long-term maintenance costs

Source: ParcPlace and INPUT

Database interfaces are a strategic thrust. For Oracle and Sybase this means providing native interfaces and for others relying on industry standard interfaces such as Microsoft's ODBC. Interfaces to object-oriented databases are also provided through Smalltalk.

5. Marketing & Distribution

ParcPlace's recent success can be attributed in part to its indirect sales strategy, particularly its close relationship with workstation manufacturers and system integrators. Its direct sales force markets to major corporations. In particular, the telecommunications, utilities, financial services and manufacturing industries have adopted VisualWorks.

ParcPlace has successfully marketed its development solutions to IS departments for enterprise-wide applications. VisualWorks preserves the investment in legacy data through database interfaces. Organizations are finding a substitute for COBOL in products like VisualWorks.

Whereas databases and 4GLs provide system solutions based on forms, fields, records, and data, VisualWorks additionally provides system solutions based on user interfaces, networking and objects.

ParcPlace's first user conference takes place in 1994. Third party developer support is strong. ParcPlace sells a Portability Pack to developers to demonstrate the cross-platform capabilities of VisualWorks.

About 60% of ParcPlace's developers seats are on Windows and OS/2 platforms, with UNIX workstations from Sun, HP and IBM making up the next major segment. Apple Macintosh, IBM RS/6000 and Digital computers represent the remaining development platforms for ParcPlace. Whereas Apple's Macintosh does not represent a primary platform for developers—it is a key platform for users.

6. Customers

Customers include the Fortune 1000, computer hardware and software manufacturers and system integrators. ParcPlace's VisualWorks has been adopted by major systems integration firms, American Management Systems, Andersen Consulting, EDS and Gemini Consulting.

Telecommunications firms, such as AT&T, BellCore, Ericsson-Ellemtel, Northern Telecom and US West, are using VisualWorks for network management and operations support systems. Utilities such as Duke Power, Snohomish County

Public Utility District and Southern California Edison use VisualWorks in applications ranging from customer service to enterprise-wide human resources systems. In manufacturing, high technology organizations like Advanced Micro Devices, Consilium, Sematech, Texas Instruments and Xilinx are examples of VisualWorks users. Other manufacturers using ParcPlace technology include Ford Motor Company and Texaco. Financial services applications have been created by Greenwich Capital Markets, Metropolitan Life, Morgan Guaranty Trust and Prudential Insurance. American Airlines, Federal Express and Hughes Aircraft are transportation industry users.

7. Partners, Alliances, Ventures

ParcPlace supplies HP, Digital Equipment and Sequent with Smalltalk technology. HP has a worldwide distribution agreement to market VisualWorks in conjunction with HP Distributed Smalltalk 2.0. Distributed Smalltalk uses HP's CORBA-compliant Distributed Object Computing Environment to embed objects in applications. For example, a spreadsheet chart may be embedded in a VisualWorks application across a network. HP will also sell other ParcPlace Smalltalk-based tools.

Digital Equipment will port VisualWorks to its 64-bit Alpha-based workstations and computers. In addition, Sun's SunSoft division will support VisualWorks in its

Distributed Objects Everywhere (DOE) CORBA-compliant architecture.

Gemini Consulting and Sequent are key partners. Object-oriented database vendors Object Design, Servio and Versant have agreements where ParcPlace will supply user interface products to these databases.

ParcPlace is active in the ANSI Smalltalk standards committee. Hundreds of third party vendors and consultants are associated with ParcPlace under its ParcPlace Partners program.

8. Financial Estimates

ParcPlace's revenues grew more than 100% from calendar year 1992 to $23.4 million in calendar year 1993. Revenues grew 94% from $13.8 million in fiscal year 1993 to $26.6 million in fiscal year 1994 (FYE March 31st). INPUT estimates that with the increased use of Smalltalk by corporate IS departments and systems integrators that ParcPlace revenues should grow at a CAGR of more than 30% over the next five years. This implies revenues will reach about $100 million in fiscal year 1998, excluding income from acquisitions.

The first full profitable year was fiscal 1994. The company has to date been investing in the tools to compete in the C/S market. In September 1992, ParcPlace acquired C programmers from Solbourne Computer for $3 million.

Service revenues are almost 40% of revenues, having grown from 28% of revenues in fiscal 1991. This increase is attributed to more consulting and training at user sites.

9. Competitive Position

ParcPlace is the leader in Smalltalk applications development software. The main Smalltalk competitors are Digitalk, Easel and IBM.

Digitalk has Smalltalk/V, a less sophisticated product than that from ParcPlace. Smalltalk/V has been marketed through retail channels at much lower prices than ParcPlace Smalltalk. It has therefore penetrated the independent developer market, whereas ParcPlace has concentrated on the MIS and corporate market.

Digitalk has recently introduced PARTS, an enterprise C/S tool that competes with VisualWorks. PARTS focuses more on integrating software from the native environment, rather than on APIs and interfaces—hence, its "wrapper" strategy that takes legacy code, and encapsulates it in software libraries that can be integrated with PARTS. For example, Digitalk can take COBOL or CICS transactions and using tools from Micro Focus create Windows DLLs that can be linked into PARTS. These software libraries are native to the Windows environment and cannot be ported across to a Macintosh. By contrast, ParcPlace focuses on developing portable interfaces to existing data that can then be moved across machines.

ParcPlace Smalltalk has better support for portability, distributed systems and scalable systems than Digitalk. ParcPlace emulates each windowing environment with its own software. The object engine insulates a ParcPlace Smalltalk-based application from the underlying operating system. Digitalk ports its software natively to each platform. Digitalk uses Microsoft's Windows tools to display Windows and Apple's Toolbox to support the Macintosh environment. Each approach has its advantages— ParcPlace's is more portable and Digitalk's enables it to take advantage of operating system features and enhancements.

ParcPlace does not provide support for team programming, whereas Digitalk has taken Intersolv's PVCS version control software and embedded it in a team support product, Team/V.

As a Smalltalk-based application development tool, VisualWorks competes with Easel's recently released Object/Studio product line. Object Studio places more emphasis on business objects and design. Easel's Enfin supports lower-level class libraries, but ParcPlace's VisualWorks has a richer, more mature class library.

IBM has developed its own Smalltalk product, VisualWare. This will be a serious competitor to VisualWorks in IBM's customer base. With release 2.0 of VisualWorks, IBM and Digitalk are a generation behind ParcPlace in their user interface.

In some markets like financial services, ParcPlace competes with NeXT's Objective C development environment. Generally customers will refer NeXT Step if they need operating system features to be object-oriented and will refer ParcPlace if portability is the goal.

VisualWorks competes with many visually-oriented C/S development tools including Gupta's SQLWindows, Powersoft's PowerBuilder and Microsoft's Visual Basic. None of these environments support Smalltalk and they are described as object-*based*, rather than object-*oriented* environments. Of these environments only ParcPlace offers cross-platform portability without the need for recompilation.

There are numerous application development tools for C/S systems and the market is crowded and fragmented. Competition from database vendors like Sybase, with their Momentum product acquired from Gain, Oracle and Informix can be expected as the market matures.

As a distributed object-oriented language, Hewlett-Packard's Distributed Smalltalk, derived from ParcPlace's Smalltalk, competes with Microsoft's OLE 2.0 and Apple's OpenDoc. In the future, particularly in electronic mail and messaging applications, Distributed Smalltalk may compete with General Magic's Telescript, an object-oriented scripting language for messaging. ParcPlace plans to support OLE 2.0 and follow-on products for object exchange from Microsoft.

10. INPUT Assessment

The portability of VisualWorks is unsurpassed among C/S development tools. Its ability to create software components that can be incrementally added to an application after it has been deployed is a major advantage for corporations that need to modify their applications to keep up with business changes.

The user interface of VisualWorks is well-designed and easy to pick up, yet is powerful. The debugging features are mature and comprehensive. The extensive class libraries provided by ParcPlace mean that companies can use VisualWorks to create a foundation of corporate objects. Companies that have well-designed objects that meet their business needs will be at a competitive advantage when they maintain and re-engineer their systems. Maintenance in a well-designed application is considerably easier using VisualWorks than using C++ libraries because programmers deal with objects.

Several customers select VisualWorks over Powersoft's PowerBuilder or Gupta's SQL Windows because it is easier to move from high level to low level programming. PowerBuilder and SQL Windows may be adequate for adding visual user interfaces to databases, but they lack some of the lower-level object support provided in Smalltalk by ParcPlace.

Traditionally Smalltalk programs have been perceived as slow. This is no longer the case, given today's faster desktop computers. The dynamic compilation feature of VisualWorks means that Smalltalk has the performance required for producing IS applications.

VisualWorks product strengths are:

- Scalability—from high-level to low-level programmers, from Macs to Windows to UNIX machines, from clients to servers, from small systems to large systems

- Maintainability—since the VisualWorks development environment supports

- Portability—across PCs, workstations and servers

- Maturity of underlying class libraries

- High quality design of VisualWorks user interface

Future product developments need to provide:

- Greater support for programming teams

- Increased support for access to multiple databases

- Higher level applications frameworks

Strengths of ParcPlace's market approach are:

- Leveraged sales through system integrators and OEMs

- Strong consulting and training services to educate customers and gain market acceptance

- High quality partners such as Hewlett-Packard, Gemini Consulting, Sequent

Risks in ParcPlace's market approach are:

- Increased competition from Powersoft as they move their software to the Macintosh and other platforms

- Increased competition from well-funded database companies that acquire or build tools comparable to VisualWorks

- Microsoft's OLE 2.0 as it becomes more widely deployed across a variety of platforms could encroach on HP's Distributed Smalltalk market

- Lack of well-trained Smalltalk programmers. ParcPlace addresses this through making its code easy to learn and training classes.

- High cost of sales—direct sales are expensive to support, currently this can be covered by training and consulting revenues but long term more efficient distribution will be required

Long term, ParcPlace needs to increase its partnering programs and grow by acquisitions and/or mergers. It needs to encourage more vertical market software vendors to adopt its tools. The company needs to build on its relationships with database vendors and may consider merging with or acquiring an object-oriented database vendor.

Company Profile

August 1994

Sequent Computer Systems

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SEQUENT

Sequent provides client/server (C/S) consulting services and a range of scalable servers. Its organization, products, services, strategy and market positioning are analyzed in this profile.

1. Principal Business

Sequent sells solutions for online transaction processing (OLTP), decision support (DSS), messaging, electronic commerce, workflow and executive education. With expertise in project management and enterprise architectures, Sequent handles system implementation from design to support.

Driven by its motto, "our business is your success", Sequent works closely with system integrators, resellers and users. Revenues, with INPUT projections, are shown in Exhibit 1.

Exhibit 1

Revenue Estimates

Year	Platforms	Services
1995 (e)	361	124
1994 (e)	321	95
1993	281	73
1992	252	55
1991	178	35

Calendar Year Revenues ($M)

□ Services
▨ Platforms
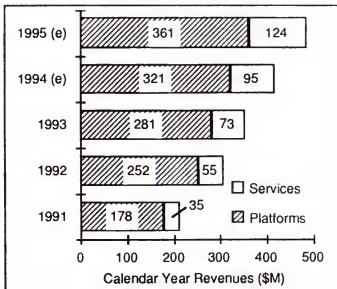
Source: INPUT estimates, Sequent Reports

2. Organization

The company's core business of manufacturing and marketing computers takes place in the *Platform Division*. This division also enhances operating systems. The *Enterprise Division*, formed in 1993, focuses on enhancing the basic platforms for OLTP, DSS and messaging. *Worldwide Field Operations* provides worldwide sales, customer support and professional services.

Karl (Casey) Powell, Chairman, CEO and President, co-founded Sequent with other ex-Intel employees and has been the chief executive since 1983. Prior to founding Sequent he was Intel's general manager for microprocessor operations. Lary Evans, Vice President and General Manager Platform Division, was formerly Vice President of Engineering. Mark Miller is Vice President of Worldwide Marketing.

Sequent has transformed its business from selling hardware platforms to selling architectural solutions based on industry standard operating systems such as Windows NT and UNIX.

3. Products

Sequent's goal is to help customers migrate smoothly from legacy systems to Sequent platforms. It increasingly achieves this through pre-sales consulting which leads to long term platform sales and ongoing service revenues. Sequent's main business comes from selling hardware platforms optimized for OLTP; but increasingly these sales will include platforms for DSS and messaging.

Sequent's servers are based on Intel processors. They provide a scalable platform for workgroup, departmental and enterprise applications, providing availability and clusterwide load balancing to optimize performance.

Exhibit 2 gives typical configuration pricing for the Symmetry 5000 series, which all run 66MHz Pentium processors. It shows the number of processors, main memory size, typical magnetic disk storage capacity and the number of users supported under DYNIX/ptx.

Sequent provides packages that allow customers with unclustered Symmetry platforms to convert their machines to a clustered configuration as computing needs grow. The Symmetry 5000 SE90 is a cluster configuration of SE 5000 machines starting at $446,000.

The Symmetry 5000 series is binary-compatible with the earlier Symmetry 2000 series, enabling customers to upgrade systems without recompiling software. Sequent provides a consulting program to help customers move their software from the 2000 series to the 5000 series. In the Symmetry 5000 series the bus speed is increased three-fold over the 2000 series, from 80Mbps to 240Mbps. Customers can mix 2000 series machines with 5000 series machines in clusters. Clustered systems will become more prevalent in the future as customers increase capacity and require high availability. The strategy of providing scalable clusters is not unlike that successfully pioneered by Digital with the VAX line of computers in the 1980s.

Exhibit 2

Symmetry 5000 Model Sample Prices

Symmetry 5000 SE20

Entry Level Configuration—$171,100
- 2 Pentiums
- 8.4GB Disk
- 64MB Memory
- 25 users

Average Configuration—$480,500
- 6 Pentiums
- 18.9GB Disk
- 256MB Memory
- 125 users

High-end Configuration—$1,030,400
- 8 Pentiums
- 111GB Disk·
- 768MB Memory
- 1,000 users

Symmetry 5000 SE60

Entry Level Configuration—$469,800
- 2 Pentiums
- 31.5GB Disk
- 256MB Memory
- 100 users

Average Configuration—$1,020,900
- 10 Pentiums
- 359GB Disk
- 512MB Memory
- 800 users

High-end Configuration—$2,625,700
- 24 Pentiums
- 236GB Disk
- 1,500MB Memory
- 2,100 users

Source: Sequent

Sequent includes consulting services for configuration and integration in its purchase price. In addition to its UNIX line, Sequent is taking a leadership position in Windows NT servers. At the low-end Sequent resells Tricord servers. Dubbed WinServer, these computers are shipped with the Windows NT Advanced Server operating system and include:

- *The WinServer 500* is an entry-level Windows NT Advanced Server platform. It has been designed for use at the departmental level, or for use in NT development projects. The 500 can support up to two Intel Pentium processors, 384 MB memory, and 18.9 GB of disk storage. Pricing begins at $13,297 for a single processor system.

- *The WinServer 5000* - the largest of the line is aimed at mainframe-class computing needs while maintaining a high level of PC-based software compatibility. Sequent's top-of-the-line platform offers 30 Pentium 60 MHz processors, 192 disks, 1.5 GB memory and 32 SCSI channels. The 5000 also offers parallel-processing communications facilities for very high band width to support enterprise-level LAN computing environments. Pricing for this platform starts at $336,000.

To support its hardware development Sequent has made a major investment in operating system expertise. Sequent works closely with Novell and Microsoft on UNIX, NetWare and Windows NT.

Sequent has invested heavily in supporting databases and software interfaces. Data warehousing organizes data for decision support. Sequent's Data Store product includes data warehouse code licensed from Red Brick Software. Decision support and transaction processing applications take advantage of Sequent's SMP architecture.

Object-oriented technology will increasingly become a key area of expertise, particularly using Microsoft's Object Linking and Embedding. Sequent will support Microsoft's Windows Open Systems Architecture (WOSA) that addresses enterprise computing.

4. Services

Sequent aims to transform the way companies use technology by moving customers' hierarchical operations to cross-functional ones. Sequent links business process re-engineering, undertaken by partners, to its IT strategy and architectural planning services. Consulting services provided by Sequent include those shown in Exhibit 3.

Enterprise architecture planning means taking strategic imperatives and defining how they are implemented in systems. Sequent identifies the key areas in which a business adds value, using value chain analysis. This is used to develop business models with Sequent's Cost/Benefit 2000 to calculate return-on-investment analysis.

Project management focuses on identifying business objectives, selecting technology and products and tracking project implementation.

Network and communications consulting defines how information flows through an organization, where bottlenecks are likely to occur and how the load can be handled efficiently. It also includes integration with existing environments and network management strategies.

Exhibit 3

Consulting Services

- Enterprise architecture planning
  - Business process re-engineering
  - Business problem analysis and goal setting
  - Cross-functional process design
  - Analysis of alternative technologies
  - Legacy system migration strategy
  - IT implementation plan

- Project management
  - Project planning and management
  - Third party software and system integrator support
  - System installation and support

- Network and communications consulting
  - Operating system selection and tuning
  - Network and peripheral support
  - Application program interface design and coding
  - Security, installation and configuration planning

- Education
  - Courses for technical managers, system administrators, technical support personnel, application developers, database administrators and system programmers
  - Topics covered include Windows NT, UNIX, Open Client/Server, Symmetry support, Oracle, Netware, performance tuning

Source: INPUT, Sequent

In addition, Sequent provides decision support consulting. This involves analyzing information requirements of knowledge workers who need to retrieve corporate data, developing data models and implementing database architectures. This results in a

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client/server system with visual displays, a decision support data store and connections to corporate data. Sequent provides expertise in OLTP and enterprise messaging. Electronic commerce and workflow are also growth areas that Sequent is addressing.

Sequent usually does not undertake applications coding, preferring to leave that to system integrators, contract programming firms and customers.

An extensive education curriculum is provided both at customer sites and at Sequent education centers located in Portland, Los Angeles, Dallas, Chicago and Washington D.C.. Course prices vary, but are typically $300-$700 per day and $1000 to $2000 per week, depending on the topic.

5. Strategy

Sequent wants to provide its customers with system solutions rather than a single hardware product. Services are a critical element in migrating customers away from legacy infrastructures. Sequent's focus is on moving customers from proprietary software architectures, such as IBM's MVS or Digital's VMS, to UNIX or Windows NT.

Client/server computing is at the heart of Sequent's two core businesses, hardware server manufacturing and enterprise systems consulting. Sequent's pre-sales consulting services have helped it to win major accounts. Its strategy is to guarantee its customers a short-term return with quick payback.

6. Marketing & Distribution

Sequent's leading markets are telecommunications, manufacturing and services. Service markets include financial services, health services and the public sector.

Sequent sells most of its products directly through 56 sales offices worldwide, including 35 in North America. European offices, located in the UK, France and Germany, account for almost 50% of revenues. Sequent has a strong presence in the Pacific Rim, with sales offices in Australia, Japan, Hong Kong and Singapore. It uses distributors in other parts of the world such as the Middle East, China and Latin America.

Increasingly, Sequent is moving to direct distribution for its high-end systems. It also partners with value-added resellers and system integrators. Since the company shipped its first symmetric multiprocessing (SMP) systems, it has directly installed more than 5,500 large-scale systems worldwide. As a full service platform provider to major corporations, Sequent's strategy is to manage user accounts on behalf of third party software suppliers and contract programmers. In the OEM market Sequent relies less on Unisys than it has in the past. Unisys teams with Sequent in areas where both companies have a direct sales force. Overseas, where Sequent lacks a presence, Unisys may distribute Sequent platforms.

7. Customers

Sequent's customers are in commercial data processing across virtually every industrial sector. Its key accounts, with their industry and applications, are shown in Exhibit 4.

Recent Sequent sales have typically been preceded by activities in decision support consulting, professional services and architectural planning. Sequent frequently supplies systems that integrate several applications.

Details of selected projects are given below:

- *Thrift Drug, Inc.* - In October 1993, this company awarded Sequent a contract to provide a large client/server decision support system aimed at reducing response time for sales and distribution queries.

  Under the contract, Sequent provided Thrift with professional consulting services for system design, integration and training, in addition to a Symmetry 2000/750 platform. Other components of the system include Lightship, a query tool from Pilot Software Co. that runs under Windows and interfaces with an Oracle 7 database.

  When the system is fully implemented, Thrift executives and managers will be able to receive query responses more quickly by accessing the company's database, which contains sales information from 500 retail stores and several mail order operations.

Exhibit 4

Major Customers

- Mervyn's - retail - prof. services, managing inventory
- Thrift Drug - retail - DSS for sales support
- NASD - financial services - operations support
- Standard & Poor's - financial services - trading info
- AT&T - communications - 911 dispatcher support
- Teleflex - communications - cellular phone billing
- AlliedSignal - manufacturing - financial DSS
- LA Times - press - DSS for advertising support
- Microsoft - software - finance, HR, support services
- Reece Australia - distributor - POS, inventory
- BP - oil - integrated regional information systems
- European Passenger Services - rail system support

Source: INPUT, Sequent

- *National Association of Securities Dealers (NASD)* - Announced in September 1993, this is a five-year contract where Sequent will provide NASD with client/server systems and professional services for corporate operations. The hardware purchase was preceded by a professional services contract that helped clinch the sale.

  During the first year of the contract, Sequent will provide NASD with consulting and education services related to the installation of two clustered Symmetry 2000/750 systems that will provide high availability for more than 1,000 users. With Sequent's assistance, NASD's goal is to expand and improve the services it offers to members, affiliates and listed

companies of the NASDAQ stock market.

- *Kenny Standard and Poor's* - In 1991, this company reassessed its technology strategy in order to continue competing in a rapidly changing market. S&P decided that a distributed, client/server model with enterprise-wide networks and data access would increase individual responsiveness. A centrally controlled database would ensure easily accessible, incorruptible data with which to do business.

  S&P enlisted the aid of Sequent to provide the hardware and the integration experience necessary to create a client/server system. Currently, the company competes using Symmetry 2000 platforms, NetWare for Sequent Information Servers and Oracle RDBMS software to supply its employees and agents with current, accurate trading information.

- *AT&T* - E9-1-1 is AT&T's enhanced emergency calling service that routes emergency calls to positions known as Public Safety Answering Points (PSAPs). After receiving a call, a PSAP automatically captures the caller's address and related data from either a local or remote Automatic Location Identification (ALI) database.

  Due to the increased need for higher transaction processing speeds and more storage capacity, AT&T developed the E9-1-1 Database Management System, which is capable of providing critical

data to dispatchers in cities with customer bases ranging from 500,000 to 30 million users. The system consists of a Sequent Symmetry 2000 system running Informix relational database management software and AT&T custom software. AT&T chose Sequent after rigorous testing that indicated that Symmetry systems had the reliability and the speed to manage a mission-critical, fault-resistant RDBMS. The Sequent-based system supports up to 30 million possible callers and multiple ALI retrieval systems to supply E9-1-1 operators with easily accessed, current information.

- *Teleflex Information Systems, Inc.* - In order to more accurately issue monthly bills and protect itself against delinquent customers, this company devised FLEXCELL, a billing and reporting system designed to streamline its cellular telephone subscription business.

  Developed on the Oracle Cooperative Server product, FLEXCELL resides on a Sequent Symmetry 2000 platform, which provides the application and parallel and scalable technology Teleflex requires to run its billing system smoothly and cost effectively.

- *Reece Australia Limited* - A growing distributor of plumbing products such as spas, baths, plumbing hardware and insulation, this company had outgrown its Wang-based batch processing system.

Used Informix as a database to improve customer service by giving store personnel access to inventory data. The system was selected for its scalability and online transaction processing capabilities. It is accessed by over 400 users and has over 30,000 product lines on a 12-processor Symmetry 2000/790 processor for production and a Symmetry 2000/750 for development and disaster recovery.

Architectural consulting clients include Federated Investors, US West, Central Point Software (now Symantec) and Tenneco. Other customers include British Petroleum, Ford Motor Company, Korea Telecom, Nedlloyd Lines, Oracle, UniHealth America and USAir.

8. Partners, Alliances, Ventures

Rather than develop its own databases, Sequent works closely with Synergy Partners, Sybase, Oracle, Informix and ASK/Ingres (now Computer Associates) to optimize their code for OLTP on Sequent platforms. Parallel database queries are the focus of the company's current efforts as these are essential for large DSS systems. OLTP focuses on data entry. DSSs focus on data retrieval. This requires parallel query processing for fast response times.

Sequent announced in June 1994 that it ran the Transaction Processing Council's TPC-B benchmark on a Symmetry 5000 SE60 with *Oracle*'s Oracle7 Release 7.1 parallel database server at 1827.30 transactions per second (tpsB). This sets a new record of $1499 per tpsB. The

Symmetry 5000 ran the DYNIX/ptx operating system and had 22 66MHz Pentium processors, 1GB of memory and 326GB of disk storage. This represents a highly cost-effective solution for organizations requiring a scalable solution that is sure to be challenged by leading vendors.

With *Informix*, Sequent is working on its Parallel Data Query project. Sequent is working with *Sybase* on its Cougar project to provide a high-availability, high-end version of Sybase, enabling more reliable support for larger installations.

Sequent is a partner in *Microsoft's* Solutions Channel program, under which the two companies' sales forces collaborate on potential contracts and sales. In addition, the service engineers for both companies provide support to customers using Sequent systems running Microsoft products.

With *Intel*, Sequent has partnered on the design its microprocessors for SMP computing. *Tricord* supplies the low-end WinServer line of products. With Intel, Tricord and Microsoft as partners Sequent is poised to lead the market for scalable Windows NT servers.

SAP AG and Sequent announced in October 1993 that the two companies will make SAP's R/3 applications software available on Sequent WinServer systems. Sequent will be one of the first vendors to make SAP's software package available on systems running Windows NT. Both SAP and Sequent have close relationships with

database vendors, and this brings Sequent into the forefront of client/server applications.

In November 1992, *Forté Software* of Oakland, CA announced a strategic partnership with Sequent. Forté's client/server applications development product is particularly suited for database applications that require interaction between users. This will fit well with Sequent's combined messaging and database thrust.

Unisys Corporation is currently Sequent's primary OEM. Under the terms of an agreement made in January 1989, Sequent provides systems to Unisys, which integrates software and peripherals for sale to its own customers. The focus of Sequent's relationship with Unisys is on international distribution and on joint sales teams. Unisys also markets Sun and HP workstations in its vertical market businesses.

Sequent expects the first in a series of messaging software products, OSIAM X.400, from *Marben* of Los Gatos, CA, a subsidiary of French parent Marben Produit, to be available on its UNIX and Windows NT servers in late 1994. It is a scalable high-end product for major corporations to convey files and data between systems using the X.400 messaging architecture. It will also be used for electronic commerce and in public electronic mail networks. Future products that Marben will make available on Sequent's platforms include X.400 message stores, X.500 directories and clustered messaging systems.

In addition, to connect disparate office mail systems Sequent is working with the *Boston Software Works* (BSW) to port BSW's InterOFFICE Message Exchange family of products to the WinServer line. This software enables mail messages and files to be exchanged between legacy, PC-LAN and public e-mail services.

9. Financial Estimates

Sequent's 1993 revenues of $353.8M represent a 15% increase over 1992 revenues of $307.3M. The revenue estimates shown in Exhibit 1 are tabulated in Exhibit 5.

Exhibit 5

Revenue Estimates

	1991	1992	1993	1994 (e)	1995 (e)
Platforms	178	252	281	321	361
Services	35	55	73	95	124
Total	213	307	354	416	485

Source: INPUT estimate

Sequent has had volatile profitability over the last five years, posting losses in 1991 and 1993. The 1993 loss of $7.5M reflected a major restructuring. This resulted in focusing the company on enterprise services and architectural design.

First quarter 1994 revenues were $93.9M, up 21% from $77.6M for the corresponding quarter in 1993. Income for the first quarter of 1994 rose 38% from $3.4M to $4.7M. Therefore, it appears that the results of the restructuring are producing improved results. Major accounts

(Fortune 1000 and Global 1000 companies) accounted for over half of first quarter systems sales. More than 75% of revenues during that time represented sales of over $500,000.

Sequent offers good price/performance now, but will increasingly be under pressure to reduce hardware prices. It remains to be seen whether Sequent can continue adding value to its platforms so that it can command high dollar amounts per sale transaction. Customers may not be prepared to increase their spending with Sequent on computing platforms, given the proliferation of smaller networked computers and increased competition from larger computer manufacturers.

In February 1993, Sequent raised $60M in equity capital. Manufacturing computers with specialized architectures like Sequent's requires significant development resources. It is unclear with Sequent's profit levels and size that it can remain competitive as a hardware manufacturer in the long term.

Revenue per employee has been increased to $246,000 in 1993. This is higher than traditional mainframe and minicomputer vendors, but not as high as Sun or Silicon Graphics which generate over $300,000 per head. At the low-end using an indirect distribution model, Compaq has revenues of over $700,000 per employee.

Accounts receivable have been increasing as Sequent places more demonstration

systems in customer sites. This is offset by increased revenues from consulting and helps increase sales long term.

10. Competitive Position

Sequent has managed to keep ahead of its competitors by astute development partnerships and a robust, scalable product line. Agility and rapid product creation help Sequent grow in an increasingly competitive environment.

Sequent's platform competitors include Hewlett-Packard (HP), Pyramid, AT&T Global Information Systems (formerly NCR), Sun Microsystems, Silicon Graphics, Data General, Digital Equipment and IBM. At the low-end, Intel-based vendors like Compaq are encroaching on Sequent's business, forcing Sequent to focus on enterprise solutions and to resell Tricord machines for workgroup and departmental servers. Amdahl and ICL, both Fujitsu companies, and Fujitsu are also competitors in high performance UNIX systems.

Hewlett-Packard is making significant inroads into corporate data centers and is a formidable competitor in the UNIX market. IBM's DB2 database has been ported to HP machines and this gives HP a strategic advantage in penetrating IBM accounts. HP is also a larger, more stable company that is an attractive supplier for risk-averse accounts. Given HP's recent announcement that it will develop follow-on products to the xxx86 series of processors with Intel is both good news and bad news for Sequent. On the one

hand it provides an upward migration path for the Intel processors currently supported by Sequent that otherwise may have been limited in performance. On the other hand it enables HP to increase its product strength in the enterprise server market with an Intel solution that is likely to compete with Sequent in the long term. However, Sequent successfully competes against HP on price/performance and scalability.

Pyramid is traditionally Sequent's competitor as a leader in SMP UNIX machines. Pyramid has a greater percentage of revenues from OEMs than Sequent, with customers like Siemens-Nixdorf and ICL. Pyramid's servers are based on MIPS microprocessors. A customer requiring an Intel-based architecture will prefer Sequent. Pyramid tends to focus more on vertical market software vendors than Sequent, which works closely with cross-industry database vendors.

AT&T GIS sells Intel-based servers that compete with Sequent. The high-end AT&T 3600 machines are parallel processing commercial machines that have a different architecture from the lower end machines. In the past, AT&T Federal Systems has sold Pyramid's MIPS-based UNIX machines.

Sun Microsystems sells servers mainly as an adjunct to its workstations. In reality they do not address the same markets as Sequent, which is more likely to sell to an IS department.

Silicon Graphics, with its Challenge servers based on MIPS processors, is a recent entrant into the UNIX SMP market. Silicon Graphics markets to the multimedia and scientific markets directly, where it does not compete with Sequent. It competes with Sequent in commercial channels through its resellers EDS and Tandem. Even though Sequent upgraded the backplane of its servers to 240MB/sec, this is not as fast as that of Silicon Graphics' Challenge servers, which have backplanes of 1200MB/sec to support multimedia. However, Sequent has undertaken excellent software engineering to make its bus perform competitively for its current customers who are mainly using text-based data.

Data General's AViiON servers compete with Sequent, but they have a limited growth path because they are built on Motorola 88000 processors. Data General is selling largely into its installed base and through resellers.

Digital Equipment's Alpha machines compete with Sequent in the downsizing market, mainly running VMS. The SMP servers running OSF (Digital's version of UNIX) are expected to ship in the third quarter of 1994. Again Digital's machines are not Intel-based.

IBM has favored parallel processing architectures over SMP machines. Its line of AIX products, starting with the low-end RS/6000 line of workstation servers does not scale up to enterprise computers seamlessly. Recently IBM

announced the Power Parallel series of computers that run Oracle Parallel Server. To date most of these machines have been sold for scientific computing. IBM's SMP machines are expected towards the end of 1994 and will run the PowerPC. This will be incompatible with IBM's installed base of RS/6000 workstations that run AIX. Until IBM has a full range of PowerPC machines it will not be able to offer the scalability of Sequent's solutions.

Compaq has an indirect distribution model, higher volumes than Sequent and low-end Intel-based servers. Compaq is increasingly moving to higher-end systems. The real competition from Compaq and other Intel-based server vendors that are moving up from the PC market is from customers who choose to run many small databases, rather than coordinate their data on central hosts. Customers that want low-cost hardware may choose a vendor like Compaq and run databases like SQL Server. Customers that want a powerful, mission-critical system in a sizable enterprise will prefer Sequent.

11. INPUT Assessment

By melding business objectives with technical implementation, systems architecture and distributed computing, Sequent has successfully focused on its core competencies. It has successfully identified databases and messaging as areas in which it can add value to basic hardware.

Sequent has successfully maintained its market leadership in enterprise UNIX-based SMP servers. It has also leveraged its sales through partners. Management, financial, marketing and product strengths and challenges are shown in Exhibits 6 to 13.

Exhibit 6

Management Strengths

- Agility
- Clear vision
- Technical expertise
- Relatively stable management team
- Ability to focus on core competencies
- Uses 100% of customers as reference accounts
- Emphasis on customer satisfaction

Source: INPUT

Sequent has shown in its early adoption of Windows NT an ability to define a direction and follow it with conviction. Sequent focuses on hardware assembly, rather than complete manufacturing. Sequent made a wise choice in choosing not to manufacture its low-end Windows NT servers. Sequent's diversification from hardware manufacturing to component assembly positions it well to withstand hardware pricing wars.

Exhibit 7

Management Challenges

- To attract top talent for systems architecture
- To be prepared to drop hardware assembly if it becomes uneconomic
- To identify workstation and PC partners

Source: INPUT

As a company matures it becomes harder to attract top talent. Sequent so far has managed to hire a balance of marketing, engineering and consulting personnel. As the business moves into services it may be harder to attract high quality systems software engineers.

Exhibit 8

Financial Strengths

- Has increased revenue per employee
- Profits are growing
- High-margin direct sales
- Profitable consulting business

Source: INPUT

Sequent uses its consulting business effectively to build relationships with customers and increase the value of each sale. Direct sales provide strong margins. In the first quarter of 1994 it increased profits over the previous year and this trend is likely to continue.

The r&d investment required to stay ahead technologically in the computer business is increasing. Working closely with Intel on processors reduces the hardware design costs. Similarly Sequent's relationship with Microsoft will reduce its long-term Windows NT r&d costs. Sequent must continue to partner with software and hardware vendors, otherwise it will not be able to afford the r&d required to be competitive.

In the server market Sequent needs to finance its market expansion rapidly so that it can command a leadership position. This will require partnerships

with key distributors of client workstations and PCs. In particular, Sequent may consider a joint-marketing agreement with a PC vendor like Compaq or a major retailer like CompUSA to reduce its cost of sales. As hardware prices fall it is essential that Sequent increase indirect distribution for workgroup and departmental machines.

Exhibit 9

Financial Challenges

- Financing r&d competitively
- Ability to finance growth needed to be a leader
- Ability to withstand server platform price reductions
- Resource allocation between services and product

Source: INPUT

In the services market, Sequent is choosing the high margin architectural areas where it can command premium prices. As expertise becomes more widespread, prices for services Sequent offers may be provided at lower cost by larger system integrators and hardware manufacturers. Sequent must constantly add services that can sustain high margins.

Sequent has excellent customers and partners. Its focus on architectural consulting is well designed. However, it may have difficulty sustaining its architecture consulting business in the long term as system integrators increase their skill levels. This is because Sequent will have difficulty being perceived as a platform-neutral vendor, which

customers sometimes require in a consulting firm.

Exhibit 10

Marketing Strengths

- Strong vendor relationships with Intel, Oracle, Sybase, Informix and Microsoft
- Pre- and post-sales consulting to accelerate hardware sales
- High-quality customers

Source: INPUT

Unlike Sequent which uses a widely available microprocessor, HP is the sole provider of PA-RISC platforms. HP needs Intel to proliferate its microprocessor architecture. Sequent must ensure that it gets early access to the processors resulting from HP-Intel joint efforts so that it can continue to keep ahead in server technology. Should this prove impossible, then Sequent may do better adding value to another hardware manufacturer's platform.

Exhibit 11

Marketing Challenges

- To articulate the enterprise architecture strategy effectively and shed the market perception as a "hot box" vendor.
- To maintain ownership of accounts where system integrators are partnering with Sequent
- To ensure that the HP-Intel relationship does not give HP a lead over Sequent in the design of Intel-based enterprise servers
- To sell into non-IS organizations
- To develop clear channel strategies for its low-end machines
- To price profitably, given falling hardware prices

Source: INPUT

Sequent needs to work more with major vertical market software vendors in areas of interest. SAP AG is an example of the type of vendor that must be attracted to Sequent's hardware. Many UNIX applications vendors, for example, think of IBM, Sun, HP or Digital as their primary platform choices. Sequent's relationship as an OEM hardware supplier to Unisys is changing. Unisys adds value to Sequent's solutions by selling them internationally in countries where Sequent cannot provide support.

The reliance on IS organizations for server sales is appropriate for the high-end servers. INPUT surveys show that there is less reliance on IS for departmental applications than in the past. Sequent needs to find regional distributors for its low-end systems that can add applications software for departmental systems.

Exhibit 12

Product and Service Strengths

- Software technology is strong
- Early adoption of Windows NT
- WinServer product selected by Microsoft
- OS, networking, database and messaging skills
- Scalable systems
- Wide range of services that lead to product sales
- Networking and client/server architecture skills

Source: INPUT

Sequent's strengths lie in optimizing system performance and anticipating market trends. To date Sequent has successfully balanced its service and

product businesses. When a company runs a product and service business the two entities can compete for resources. There may be a temptation to ship incomplete products, knowing that the service business can fix them with upgrades and maintenance after they have been shipped. Sequent is guarding against this by having strong project management.

Sequent has successfully provided technical leadership in server technology. It must continue to upgrade systems, increase performance and build on its cluster expertise. As Sequent's market penetration increases, more drivers, software components and hardware interfaces will be required. Increased cooperation from third parties will be essential.

Exhibit 13

Product and Service Challenges

- To maintain computer architecture leadership
- To be able to support interfaces profitably
- No workstation or PCs in product line
- Bus bandwidth is relatively low for multimedia

Source: INPUT

Given Microsoft's commitment to the enterprise messaging market, Sequent's communications servers for electronic

mail and workflow should be increasingly successful. Sequent's non-Microsoft messaging solutions will enhance its ability to provide integrated mail and workflow applications.

By concentrating on services and software, Sequent can become a system architect, integrator and reseller of third party hardware should the capital requirements for hardware assembly become too great. Investment in systems software and object technology provides Sequent with additional assets.

In summary, Sequent's traditional "hot UNIX box" business has become extremely competitive. Sequent has responded well to the competition by diversifying from OLTP into DSS, messaging and executive education. Early diversification from UNIX to Windows NT positions Sequent well for becoming a leading high-end Windows NT server vendor.

Note: Sequent, Symmetry, DYNIX, WinServer are registered trademarks of Sequent Computers. Cost/Benefit 2000 is a trademark of Sequent Computer Systems. All other product names are trademarks or registered trademarks of their respective vendors.

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- **Systems plans**
- **Peer position**

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Vendor Profile

December 1994

NeXT Computer

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NeXT develops and markets an object-oriented operating environment. Database interfaces and object libraries make this an attractive client/server development platform for both PCs and workstations.

1. Description of Principal Business

NeXT is a technology pioneer in object-oriented (OO) desktop computing. Its mission is to lead the component software revolution and be the largest object-oriented software company. NeXT provides shrink-wrapped software as well as licensing its code to major hardware manufacturers. It sells both an operating environment for users, NEXTSTEP, and development tools, NEXTSTEP Developer, Portable Distributed Objects (PDO), Enterprise Objects Framework (EOF) and NEXTTIME. NeXT focuses on selling its tools for the rapid development of mission-

critical commercial applications that need to be easily modifiable.

2. Organization

NeXT's management team is led by Steve Jobs who founded the company in 1985 with other Apple Computer executives. Sina Tamaddon is executive director of professional services. Dominique Trempont from Raychem is CFO and VP of G&A. Jean-Marie Hullot is chief technical officer, a leading designer of the NEXTSTEP user interface, and co-leads engineering with Paul Hegarty, a

CLSP

principal architect of NeXT's software. Outside directors include Larry Ellison, CEO of Oracle; Mikio Akayama, Deputy Senior General Manager Corporate Strategy and Development, Canon; and Daniel Case, President of investment firm Hambrecht and Quist.

NeXT has approximately 275 employees, with 100 in engineering and 50 in support, training and consulting services. Approximately 100 are in sales and marketing. NeXT has a direct sales force and provides quality training and support in object-oriented design and programming, as well as in NeXT's software.

3. Products and Services

NEXTSTEP provides a complete user environment, with on-line documentation and basic applications including an editor, multimedia e-mail, full-text search, file management, games and communications software.

NEXTSTEP Developer provides Objective C and Gnu C++ development tools. It also provides object-oriented software components. Both products come with extensive on-line documentation. NEXTSTEP lists for $799 but in reality users pay about $400 per user.

NEXTSTEP initially ran on Motorola 680xx-based NeXT's "black cube" desktop computers, but in 1993 the company withdrew from hardware manufacturing and started shipping NEXTSTEP 3.1 on Intel platforms. In 1994, NEXTSTEP 3.2 reached a new level of performance when it shipped on HP's PA-RISC workstation. NEXTSTEP 3.3 first shipped on Intel platforms in 4Q94. HP and Sun SPARC platforms will ship NEXTSTEP 3.3 in 1Q95.

Early versions of NEXTSTEP were tightly integrated with NeXT's proprietary hardware and porting parts of the software to other environments was tricky. This changed at the end of 1993, when NeXT announced it was working with Sun to create *OpenStep*—software derived from NEXTSTEP to run on other UNIX environments. OpenStep will also ship from workstation vendors Digital and HP.

NEXTSTEP is basically a UNIX-like operating system with a simple, powerful user interface. NEXTSTEP provides robust multitasking that enables multiple networked processes to run simultaneously, a feature of Windows95. Documents are displayed in the printer language PostScript. It scrolls documents on the screen smoothly and avoids the need for previewing documents before they are printed. Like other UNIX platforms, NEXTSTEP is ideal for messaging and communications. TCP/IP and Netware communications support is built into NEXTSTEP.

NeXT's goal is to provide an application development environment that is 5 to 10 times more productive than conventional approaches, such as procedural programs. In 1995, NEXTSTEP 4.0 is due. It will provide a new InterfaceBuilder to create user interfaces and a new ProjectBuilder to manage applications development.

In 1996, NeXT will ship Mecca which will compete with Microsoft's Cairo object-oriented environment. Although NeXT has not made formal announcements, INPUT believes that Mecca will run across other operating systems, enabling NeXT to offer an alternative to Microsoft's OLE or Taligent's TalAE on Windows NT and Windows95. Mecca will provide a new foundation library and new support for distributed objects. NeXT

will provide conversion tools to convert older software to Mecca. Conversion times are expected to take from a few days to a few weeks for production applications.

PDO runs on a UNIX server to enable NEXTSTEP clients to share server applications. It first shipped in 1993 on HP PA-RISC machines running HP-UX. PDO 2.0 runs on HP-UX, SunOS and Solaris and supports C++. It will also run on Digital's OSF/1 in 1Q95.

DBKit provides client/server database support and automatically generates SQL database query code. A more powerful product– *Enterprise Objects Framework (EOF)* ($299)– shipped in 4Q94. It feeds data from a database not into mere display objects, as DBKit does, but into business objects that can be both manipulated and displayed. This makes it easy for system architects to apply rules to objects in a central location, rather than customizing each screen display as is done by some client/server development tools. Currently EOF runs on client machines, but in the future there will be a server version. EOF enables developers to create powerful user interfaces quickly.

Insignia's SoftPC is shipped with NEXTSTEP in a trial version, valid for 30 days. This enables PC applications to run on NeXTSTEP. SoftPC will ship with NEXTSTEP 4.0 in a version that enables Windows95 windows to run alongside NEXTSTEP windows.

NEXTIME can play videos in cinepak or Apple's QuickTime formats from disk files, CD-ROM or across a network. NEXTIME 2.0 will allow you to record video on PCs, will have an API, and will support MPEG compression for digital videos. It will ship with NEXTSTEP 4.0.

NeXT offers excellent technical support via CompuServe, the internet, fax and phone. It has an automated fax-back/e-mail system that intelligently responds to customer inquiries. NeXT provides high quality on-line documentation and comprehensive training courses for IS managers, programmers and users. It has an extensive third party software catalog, with software components, ObjectWare, as well as complete applications.

4. Client/Server Strategy

NEXTSTEP comes bundled with support for interfaces to Oracle and Sybase databases. Distributed objects and messaging simplify networking. NeXT's focus is on client software and communications. PDO software is supplied for leading UNIX servers. Future versions of EOF will also run on servers.

NeXT is already using a third-generation, client/server architecture that connects systems with distributed objects and messaging. Its Enterprise Objects Framework is ahead of the industry in the functionality it provides for creating user interfaces to databases.

5. Marketing & Distribution

Headquartered in Redwood City, CA, NeXT has U.S. sales offices in Washington D.C., New York and Chicago. NeXT has European offices in Munich, London and Paris. It also has an office in Tokyo.

NeXT has positioned itself in key vertical markets–financial services, telecommunications and government. NeXT has been accepted in financial services because it is a market where applications need to be developed in hours or days, rather than weeks or months.

6. Customers

By mid-1993, NeXT had an installed base of 50,000 users and 40,000 orders for software on Intel platforms. NeXT currently has approximately 120,000 users. Many NeXT customers are interested in the system for its affordable development platform. With fewer overlapping windows than MS-Windows and a more robust architecture, its users generally find it a highly productive system. The main complaint of customers is that they cannot run natively their general office applications, many claiming that Insignia's SoftWindows was not an efficient solution for running PC software on top of NEXTSTEP.

Chrysler Financial Corporation uses NEXTSTEP throughout its organization for retail financing. It required systems that were easy to maintain and customize and would give its users high productivity. Chrysler wrote its first 5 custom applications in 90 days and over the next 90 days developed another 19 custom applications. Chrysler Financial believes that NEXTSTEP gives it a significant advantage over competitors.

McCaw Cellular is using NEXTSTEP to create Project Axys–a complete customer service system that manages all customer interaction between McCaw and its dealer/distributors. Other telecommunications companies, such as MCI and AT&T, have found a competitive advantage using NEXTSTEP.

Pencom, a professional services firm, provides programming services and recruiting services. It runs its business on NEXTSTEP as well as specializing in supplying NEXTSTEP programmers to its clients. It has found NEXTSTEP to be a highly productive and cost-effective environment for supporting UNIX programmers.

Phibro Energy is a market leader in crude oil trading that is reselling its NEXTSTEP application to create energy trading systems in the oil and gas industry.

Swiss Bank Corporation is a key NeXT customer that has been able to rapidly develop custom applications using NEXTSTEP. In the financial services market, it uses NEXTSTEP for trading applications as well as for electronic mail and office automation.

7. Partners, Alliances, Ventures

NeXT's hardware partners include Canon, Digital Equipment, Hewlett-Packard and Sun. In addition, PCs from Compaq, Dell, Data General, EPSON America, NEC Technologies and Siemens support NEXTSTEP. Some of these companies, together with Continental Computer Systems and some smaller VARs, offer NEXTSTEP pre-configured on Intel-based PCs.

System integrators such as Booz-Allen and Hamilton, KPMG Peat Marwick, SHL Systemhouse and Trident Data Systems have formed strategic alliances with NeXT. SHL's technology center in Boulder, CO offers NEXTSTEP-based programming services and support. NeXT has signed up over 70 value-added resellers and system integrators, who typically pay a one-time $7000 fee for support. NeXT's ObjectChannel supports VARs, including Advanced Information Solutions, Advance 2000, The Apex Group, B-Cubed, Dilan, Duplifax, Information Technology Solutions, Linotype, NorthStar Technologies, Pencom, Proxima, TRW Systems Engineering and others.

NeXT also markets through distributors, such as Ingram Micro. NACSCORP distributes to the educational community. NeXT has a cottage industry of boutique software developers. In all there are over 500 applications available for NEXTSTEP, that range from program development utilities to vertical market applications.

A problem for NeXT customers is that NEXTSTEP has been deserted by Lotus and Novell's WordPerfect division. Lotus created the Improv spreadsheet for NEXTSTEP, but has since moved it to other platforms. Its place has been taken by spreadsheets from companies like Lighthouse (San Mateo, CA), a leading NEXTSTEP developer. Frame Technologies reaffirmed its support to NeXT after dropping support for its FrameMaker desktop publishing product.

8. Financial Estimates

NeXT does not formally publish its financials, but INPUT estimates NeXT's 1993 revenues were about $11 million (excluding Sun's $10 million investment). NeXT expects 1994 revenues to be between $40 million and $50 million–representing significant growth. The challenge for NeXT is to sustain this growth, some of which is the result of OEM deals. NeXT's 1994 revenue estimates are above INPUT's prior expectations because of accelerating interest in object-oriented platforms, especially since Microsoft's Windows95 has been delayed beyond its original 1994 ship date. NeXT expects 75% of its revenues to come from direct sales in 1994.

9. Competitive Position

NEXTSTEP competes on several levels:

· Desktop UNIX

· Multitasking PC operating systems

· Object-oriented operating systems

· Distributed object frameworks

As a desktop UNIX system, NEXTSTEP has one of the best, if not the best, user interface designs. NEXTSTEP relies less on overlapping windows and more on icons than traditional Microsoft and Apple Macintosh windowing environments. This increases user productivity. Competitors in the area of friendly user interfaces to desktop UNIX systems include Silicon Graphics (with Indy computers) and Santa Cruz Operation's Open Desktop for Intel-based PCs. Irix is stronger than NEXTSTEP for visualization, 3-D modeling and animation, however the user interface is not as well integrated or simple to use as NEXTSTEP. SCO's Open Desktop tends to be used by small businesses or branch offices.

Purchasers also buy NEXTSTEP as an affordable alternative to a UNIX workstation for its system administration, electronic mail, UNIX development, networking and multitasking capabilities. In this segment, Novell's UnixWare, Sun's Solaris with CDE and public domain Linux are competitors. NEXTSTEP is differentiated by its integrated tools that make it easier to learn and support.

In the object-oriented operating system market, NEXTSTEP has no significant direct competitors in the PC market, although object-oriented operating systems have been designed for PDAs and TV set-top systems. However, NEXTSTEP and OpenStep compete with object-oriented environments that run on top of other operating systems, namely Taligent's TalAE and Microsoft's OLE.

Taligent has approximately three times the number of people than NeXT in engineering. It also has to wrestle with multiple partners as investors which makes its business model complex. This makes NeXT, with its well-tested platform, a nimbler, more experienced competitor than Taligent.

NeXT cannot match the development resources of Microsoft, nor its distribution capabilities. Microsoft's installed base is generally regarded as its main advantage over NeXT. Microsoft has a tremendous liability architecturally created by the need to provide compatibility and migration from earlier software releases. This adversely affects the robustness of Microsoft's products.

As a development tool, NEXTSTEP Developer competes with Microsoft's Visual C++ and Visual Basic plus third party tools that surround them. NeXT's bundled approach to marketing its code offers the developer a more integrated environment than that supplied by Microsoft. NeXT software also provides more integrated support for communications.

In the distributed object frameworks market, NeXT has a promising opportunity. Sun's DOE (Distributed Objects Everywhere) uses OpenStep as a major component for its distributed object infrastructure.

With Sun, Digital and HP licensing OpenStep, NeXT can build on the NFS and TCP/IP installed base to become the primary distributed object infrastructure for UNIX systems. It can then extend this framework to other platforms. Other companies have distributed object frameworks such as HP and ParcPlace with Distributed Smalltalk and General Magic with Telescript.

DBKit competes with PowerBuilder or Gupta's SQL Windows. EOF competes with Easel's ObjectStudio, ParcPlace's VisualWorks and IBM's VisualAge. EOF is technically strong compared to these products, however it does not yet run on Windows. This is an advantage, since Windows lacks the robustness of NEXTSTEP, but also a disadvantage, since the installed base of enterprise client machines is largely Windows-based.

As Windows, the MacOS and UNIX evolve, competitors are starting to add NeXT-like user interfaces to development tools. The best chance NeXT has to counter this attack is to become the distributed object platform of choice across these environments. To do this, NeXT must rapidly deploy OpenStep on platforms other than UNIX.

10. Outlook

NeXT has strong product design with mature support for software components. As a client/server development environment its strategic advantage is integrated support for user interfaces, networking and database interfaces. NeXT is striving to keep its lead in the objecte-oriented development tools market. If NeXT can use its technology to develop superior tools faster than competitors, it will continue to find niche buyers.

NeXT's relationships with SHL Systemhouse, HP, Digital and Canon should help it gain market share. In addition, several PC vendors ship pre-configured NEXTSTEP systems. Recognizing that it cannot compete with Microsoft for the mass operating system market, NeXT is likely to compete with it in the client/server development tools market against Visual C++, Visual Basic, OLE, the Windows SDK and third party additions these

products. NeXT's software currently runs on Motorola and Intel architectures as well as the RISC processors of leading UNIX vendors.

11. INPUT Assessment

NeXT has a strong, relatively stable management team. Its environment is high energy and creative, yet pragmatic. The company has become more market driven in the last two years, yet continues to attract high calibre engineers. Exhibit 1 summarizes its management strengths.

Many NeXT customers find NEXTSTEP more productive and less prone to crashes than the typical Macintosh or Windows operating system. In checking references for NeXT, INPUT found an unusually high degree of satisfaction among NeXT users and programmers. The major complaint of users was that NeXT could not attract leading software developers. Users want to have common applications like WordPerfect and Microsoft Office available on NEXTSTEP natively, rather than on Insignia's SoftPC that enables PC applications to run on NEXTSTEP.

Exhibit 1

Management Strengths

- Steve Jobs commands media attention, promotes a strong vision and clearly articulates trends
- Strong, enthusiastic management
- Energetic, talented team
- Innovative, creative ideas

Exhibit 2 provides a list of management challenges.

Exhibit 2

Management Challenges

- To position the company as a market leader in key niches
- Establish credibility with mainstream IS managers
- To take the company to the next level of growth

With NEXTSTEP 4.0, SoftPC will improve to be more integrated with NEXTSTEP. Customers complaints about lack of software are dwarfed by the positive feelings the NeXT environment instills in its programmers and users.

Product strengths and weaknesses are shown in Exhibit 3 and 4.

A perceived disadvantage of NEXTSTEP is that it is written in Objective C, rather than C++ which the majority of object-oriented C++ programmers use. However, NEXTSTEP does support C++ and its main value is in its foundation classes and frameworks which are a feature of NEXTSTEP, rather than of C++ or Objective C.

Ever since NeXT made its debut on the stage of the Symphony Hall in San Francisco, its skills at promotion have been very strong. The company needs to expand its vertical marketing activities. For example, it can expand its financial services expertise into insurance and corporate financial departments. Marketing strengths and weaknesses are shown in Exhibits 5 and 6.

Exhibit 3

Product Strengths

- Consistent, efficient user interface

- PostScript display provides identical screen image to printer image for documents. It also provides smooth scrolling and zooming. Internals of UNIX are hidden, although experts can run UNIX shell commands. Single button mouse operations mean few human errors are made, in contrast to a traditional Motif UNIX user interface, where 3-button mice can make commands confusing

- Value-packed development system – the user code takes up over 200MB of hard disk storage and the basic development system provides over 100 MB. The functionality is more than that found in Windows with either Visual Basic or Visual C++ from Microsoft

- Well-integrated

- Enterprise Objects module provides support for business objects

- Powerful tools for native interfaces to Oracle and Sybase databases

- Memory management, multitasking and multi-threading in the operating system mean a significantly more robust environment than Windows or MacOS. Also the system supports real-time feeds

Exhibit 4

Product Challenges

- Lack of drivers for PCs – only a few SCSI controllers, fax modems, display boards, compact disk drives, sound boards work with NeXT software

- Does not plug and play well with Windows. PC users have two options: to reboot their machines when they want to run NEXTSTEP or run a package like the SoftPC from Insignia solutions on top of NEXTSTEP

- To modularize the software so that NeXT can sell objects for specific markets and business processes

Exhibit 5

Marketing Strengths

- Strong public relations

- Cottage industry of objectware vendors

- Productive, enthusiastic customers

- Responsive technical support by phone, fax, electronic mail and bulletin boards

- Strong training program that recognizes the roles different developers need to play in an OO development team

Exhibit 6

Marketing Challenges

- To expand financial services applications into related areas like insurance

- To enable its developers to get adequate funding

- To gain mindshare as a distributed systems software platform

A problem for NeXT is that many of its developers are small and underfunded. NeXT needs to continue on its path of licensing subsets of NEXTSTEP as software components. NeXT is recognized for its user interface and development tools, but it needs to build on its distributed object expertise and encourage corporate application vendors to build on its infrastructure.

For many years NeXT has had an object-oriented mail system that it could unbundle and use as the foundation for workflow and messaging products. It has missed a window of opportunity to build a product like Lotus Notes–it is too late to target the Lotus Notes and electronic mail marketplace.

NeXT's opportunity is to simplify the integration of client/server systems through its approach to distributed business objects. In the third generation of inter-enterprise client/server systems that connect databases with messaging systems, NeXT has the potential to be a leading vendor of distributed object infrastructures.

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December 1994

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ILLUSTRA

Illustra's Object Relational Database Management System (ORDBMS), the Illustra Server, is an exciting platform for developers of multimedia, financial, document and geographic information systems.

1. Description of Principal Business

Illustra Information Technologies is an emerging database and application development tool vendor. Illustra's ORDBMS stores, manages and analyzes images, video, sound, maps, text and time series, as well as traditional relational tables. It positions the Illustra Server as "the database for cyberspace". Illustra's value proposition is that it provides a superior development and deployment environment for customers who need to research and manage complex forms of information.

Illustra offers system integrators and value-added resellers a significant opportunity to rapidly create new software applications. Illustra markets through both indirect and direct channels. It also works closely with the academic community.

2. Organization

Gary Morgenthaler and Michael Stonebraker, Ingres founders, with Paula Hawthorn started Illustra (as Miro, then Montage) in 1992. Dick Williams, former President of Digital Research, leads a seasoned management team. Paula Hawthorn, V.P., Engineering, from Hewlett-Packard is well-respected in the database community, having worked on early Ingres research. With a strong background in market development, Bruce Golden, V.P., Marketing, helped launch Sun Microsystems in financial and international markets. Steve Maysonave, Senior Vice President of Sales, is also a Digital Research alumnus with extensive OEM, VAR and direct sales experience. Experience from Sybase and IBM is also found in the management team. Illustra has over 60 employees in its Oakland head office. Offices in New York and Washington D.C., focus on financial services and federal markets, respectively. A New Jersey branch office supports other east coast accounts.

3. Client/Server Products and Services

Illustra combines object-oriented technology with that of traditional databases. A major advantage of using Illustra is that it provides integrated development tools for specific data types.

Designed to run in client/server networks, Illustra supports extensions to the industry standard SQL-3 database query language. The architecture is modular. Using a razor and blades analogy, software libraries for supporting specific data types are known as DataBlades. The main advantages of the architecture are that it:
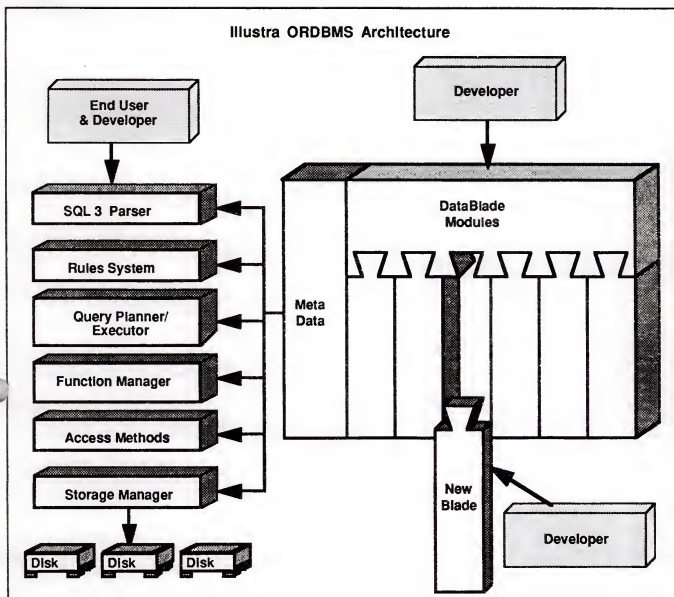
- Accelerates application development

- Reduces the programming required to handle unusual data types

- Provides for reusability of code

Exhibit 1 shows the key components.

The heart of the system is the Illustra Server, the main database engine. Illustra Object Knowledge simplifies display, manipulation and query of multimedia objects. Illustra, either alone or in partnership with a third-party developer, creates DataBlades to support data types that are awkward for traditional databases to handle.

A key feature of Illustra is its support for image management, the Image DataBlade stores, retrieves and manipulates a variety of raster image formats. It is suitable for document images and multimedia system support. Illustra's partners have extended the image handling to support medical images, from diagnostic equipment. A Basic Image Query Datablade will ship shortly to perform single image recognition.

Exhibit 1

Illustra ORDBMS Architecture

For text data, the Text DataBlade manipulates data in 30 formats, including those from word processors. Doc-Tree is a new access method that supports text retrieval using boolean and weighted average searches. It is specialized to handle one to many relationships with word types and can be used for managing clinical records and doctors' notes. The Text DataBlade is complementary to a full-text retrieval system, as marketed by Verity (Mountain View, CA) and Fulcrum (Ottawa, Canada).

The 2D Spatial DataBlade supplies over 100 SQL functions to manipulate over nine different spatial data types like polygon, circle, point and line. A 3D Spatial Datablade supports polyhedra and can be used to support

3D modeling and visualization applications. An example ships with the product that handles AutoCAD files. For example, video can be delivered at 30 frames per second.

The TimeSeries DataBlade can be used to support analysis and management of financial, scientific and retail data. It supports historical calendars and time-series data. For example, it can compare time-series from Wall Street, Tokyo and London financial exchanges that operate on different time-zones and trading cycles.

Illustra is working with MathSoft's StatSci division to produce an S-Plus interface for Illustra. S-Plus is a statistical system that is used by financial services and scientific customers. An Internet Datablade (name still to be determined) is expected to be available shortly to support WorldWideWeb (WWW) servers on the internet.

The Illustra Developer's Program includes server software, two DataBlades and a DataBlade Developer's Kit. The DataBlade Developer's Kit is designed to enable software developers to create their own extensions to Illustra.

A floating license manager enables Illustra to price by the number of concurrent users. When Illustra was first launched the database engine was priced at a low $995 per user and DataBlades were $695 each. Illustra's price has been raised since its initial launch to $1,995 for a single user license. A 10-user Illustra server costs $1,200 per user and in quantity the per-user price falls to $900. This is in line with database pricing trends forced on the relational database industry by Microsoft. Illustra's prices are below those historically charged for mid-range databases. Exhibit 2 gives some representative prices.

Exhibit 2

Representative Product Starting Prices

- Illustra Server for Windows NT - $1,995
- Illustra Developer's Program - $4,495
- DataBlade Developer's Kit - $495
- DataBlades
  - TimeSeries - $1,495
  - Basic Video - $395
  - Text - $795
  - Text Conversion - $395
  - Image - $995
  - Basic Image Query - $395
  - 2D Spatial- $995
  - 3D Spatial- $995

Illustra was designed from the outset to be portable and scalable. Illustra was launched on UNIX systems, with the client software running under X-Windows. Illustra runs on Sun (Solaris Intel and SPARC), Silicon Graphics and Digital platforms. Illustra is moving to support diverse clients including Windows and Macintosh. In addition, a Windows NT version is already shipping.

Milestones for Illustra are shown in Exhibit 3.

Exhibit 3

Milestones

- 1992 - Illustra founded
- 3Q94 - Illustra 2.0 shipped
- 4Q94 - Internet DataBlade announced
- 4Q94 - International version of Illustra released
- 1Q95 - second round of grants to universities for research using Illustra

Illustra 2.0 improves performance, supports 64-bit architectures and optimizes queries better than the original release. It also supports FIPS 127-2 data processing standards.

Illustra has a training and technical support program, together with a creative research grant program. Software updates may be purchased independently of a technical support program at 30% of the license fee on an annual basis. Customers who prefer not to be tied to annual update fees may upgrade when a new release becomes available for 65% of the list price. Exhibit 4 shows support programs.

Exhibit 4

```
┌─────────────────────────────────────────┐
│       Customer and Reseller Support      │
│                                          │
│ • Engines for Innovation Research Grant  │
│   Program - enables universities to use  │
│   Illustra for research                  │
│                                          │
│ • Standard Support - telephone and       │
│   bulletin board support - 2,500 per yr. │
│   for one primary and one backup person, │
│   additional persons at $4,000 per yr.   │
│                                          │
│ • Bulletin Board Support - $3,000 per yr.│
│                                          │
│ • Consulting - $1,500 per day plus       │
│   expenses                               │
│                                          │
│ • Training Classes - Using Illustra -    │
│   $650 for two days                      │
└─────────────────────────────────────────┘
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4. Client/Server Strategy

In an enterprise environment, Illustra's client and server software provides all or part of an application platform. For example, an application may run with a traditional SQL database that interfaces to Illustra. Alternatively an entire application may be built using Illustra. Illustra currently offers interfaces to Sybase.

In early 1995 an ODBC database interface can be expected. This will enable SQL-based GUI

development tools, such as Powersoft's PowerBuilder and Microsoft's Visual Basic, to create user interfaces for querying and reporting from Illustra databases.

Initial applications are in image processing, document management, hospital systems, geographic information systems, financial systems and executive decision support. The Illustra database is increasingly moving to support multimedia data mining applications. It is also used in the intelligence community, online services, portfolio management, risk management and derivatives applications.

5. Marketing & Distribution

Illustra is positioned as a distinct alternative to relational databases, such as Oracle, Sybase and Informix, and object-oriented databases, such as Object Store, Objectivity and Versant. Illustra sells databases both directly, to user organizations, and indirectly, through leveraged OEM and VAR channels. Illustra has also found resellers with specific industry knowledge.

Illustra has successfully courted the academic community by offering rewards for creative applications of its software in its Engines for Innovation Grant Program. Research using Illustra covers such applications as:

· Multimedia - libraries, video over the internet

· Medical systems - Knowledge-based systems, 3D brain images, genome analysis

· Geographical and mapping systems - land use, Intelligent Vehicle Highway System data management, climate analysis

· Database management - benchmarks, deductive databases

Illustra places heavy emphasis on supporting indirect channels.

6. Customers

Illustra has approximately 140 installations. Representative customers come from government, computer hardware and software development, health services, financial services and pharmaceutical markets. Illustra sells through system integrators to the government where its technology can be applied to intelligence applications.

The American Board of Family Practice - Lexington, KY - selected Illustra to store multimedia information for recertification of physicians.

Beijing Trisun-Wyse -China - is automating medical records and hospital information systems. This is a joint-venture company set up by Wyse Technology. Wyse will run Illustra on Intel platforms with SunSoft's Solaris operating system. X-Rays and medical images can be combined with traditional patient record data.

NIMCO (formerly National Investment Management) - Milwaukee, WI - is tracking time-series of approximately 3,000 securities over 240 months for a portfolio management system.

7. Partners, Alliances, Ventures

Illustra has porting relationships with hardware manufacturers: Digital, Silicon Graphics, Sun. Its resellers and developers include:

- Fujitsu Network Transmission Systems - for five network management systems,

related to its SONET (Synchronous Optical Network) products

- Fusion Systems Group

- Liant Software - for interfaces to C++/Views 3.0 a visual compiler

- MathSoft - StatSci Division - for statistical software

- SHL Systemhouse - for object-oriented systems integration

- Teknekron Software Systems

- TriTeal Corporation

- TRW - Digital Media Systems - InfoWeb system for analyzing all forms of information from online services, electronic mail and databases

- Visible Decisions - Information Animation - visualization technology for financial services

- Unify - for its VISION user interface development tools to support multiple databases simultaneously

8. Financial Estimates

Illustra, as an emerging company, does not publish financials. INPUT estimates that 1994 revenues will be between $2M to $4M and ranging from $6M to $10M in 1995. These numbers could be significantly higher if a major systems integrator aggressively marketed Illustra's technology.

Accel Partners, Morgenthaler Ventures, Oak Investment Group, Sequoia Capital and Trinity Ventures as well as individuals, are financing Illustra. Informix founder Roger

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major relational database vendors that potentially compete with Illustra are Computer Associates, IBM, Informix, Microsoft, Oracle and Sybase. Each of these vendors can, now or in the future, extend their current databases by adding support for objects, although this is a major technical challenge that will typically require multi-year development efforts.

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Wang, in particular, is actively building partnerships with software vendors, such as Powersoft, Gupta, Microsoft (for Visual Basic controls) and Information Builders, for client/server imaging solutions. For example, Wang is a partner in Powersoft's Client/Server Open Development Environment (CODE) program. The combination of Wang's imaging software, PowerBuilder and a SQL-compatible relational database is more complex to manage and more expensive than Illustra's solution.

GIS Systems

Geographic information systems vendors like Intergraph and its developers present both competition and an opportunity. Many of these vendors have significant investment in proprietary code. Long term they may be more competitive if they move their development to an open platform like Illustra.

Object-relational Databases

Illustra is not the only company to recognize the gulf between object-oriented and

relational databases. UniSQL and HP are often considered competitors to Illustra. Both UniSQL and Hewlett-Packard, with OdAptor, have jumped into the gap with software that connects object-oriented applications to standard relational databases. However, Illustra focuses more on providing development environments for very specific data types, rather than targeting more general object-oriented development environments. For general object-oriented applications that require tight binding with Smalltalk libraries then UniSQL or HP provide more general solutions. However, for a specific application like imaging, Illustra offers richer programming libraries.

10. INPUT Assessment

Illustra has a strong management team, clear vision and solid product architecture. Like most start-ups, Illustra is constrained by its small size and limited access to capital. It is overcoming these weaknesses by partnering with third party developers. Exhibit 5 summarizes its management strengths.

Exhibit 5

Management Strengths

- Understands management of emerging technology companies
- Ability to articulate vision and product differentiation
- Well-balanced, strong development and marketing teams
- Can attract talented engineers through its strong academic ties

Exhibit 6 provides a list of management challenges.

Exhibit 6

Management Challenges

- To keep ahead of established database vendors
- To grow the company fast enough to gain critical mass
- To select appropriate resellers who can both understand the technology and deploy solutions rapidly

Illustra is designed for professional programmers. Its extensible architecture makes it attractive for multimedia applications. Its strengths are described in Exhibit 7.

In many multimedia applications there is a close relationship between creative artist and programmer. Illustra needs to provide modules that enable creative users to build parts of an application on standard PC and Macintosh clients.

Exhibit 7

Product Strengths

- Simplified development environment for spatial and imaging applications
- Ability to add new datatypes
- Integration of data security with objects
- Interchangeable object-oriented components
- Conversion between different data formats
- Modular DataBlades architecture
- Compatibility with SQL
- Wide-range of data types, in particular image, spatial data, text, video and sound

The current programming interface is useful for professional programmers, but is too hard for users who occasionally program. Illustra

lacks an entry level component like Claris's FileMaker that can grow into a fully-fledged commercial database, supported by professional programmers. To be widely accepted Illustra needs to consider broadening the class of programmer that it serves, from occasional users to expert programmers. As a new product, Illustra is continually improving the reliability and performance of its software. Other product challenges faced by Illustra are given in Exhibit 8.

Despite a formidable long term threat from established database vendors, Illustra has a window of opportunity in which it can succeed. To do this it needs to gain market presence in a few key vertical markets and get the major developers and resellers for these markets to commit to its platform.

executes well and sells a standard product at a fair price, Illustra can displace some of the proprietary imaging and GIS software that is expensive to maintain. Illustra may also replace some applications built using a combination of C, C++ or relational databases. It is less likely to replace applications built solely on a single relational database.

Illustra has strong market awareness. It has selected innovative partners that can help it grow, but has yet to attract major commitments from large partners to give it credibility in mature accounts. Illustra has concentrated on gaining development partners and resellers. It needs to add more business partners that can finance its growth in vertical markets. Exhibit 9 summarizes Illustra's marketing strengths.

Exhibit 8

Product Challenges

- To keep interfaces and supported formats up to date
- To provide high-performance for multimedia
- To keep ahead technically
- Ensure product is robust and industrial strength
- To embrace OLE and OpenDoc to interface with PC application packages
- To broaden the range of platforms supported
- To create interfaces to legacy data

Exhibit 9

Marketing Strengths

- Ability to carve a unique position in a fragmenting database market
- Understands OEM and VAR channels
- Strong positioning and public relations
- Illustra Developer's Program
- Relationships with leading UNIX hardware manufacturers

Exhibit 10

Marketing Challenges

- To gain stronger LAN and PC market presence
- To find markets where multimedia has a strong economic justification
- To avoid being crushed by major database vendors like Oracle, Sybase, Informix and IBM

Illustra faces similar marketing challenges to those experienced by Sun Microsystems when it started. Sun faced competition from an installed base of proprietary workstation vendors, but believed that it could replace the installed base more cost effectively. Over time many of the hardware vendors like Daisy, Valid Logic and Computervision moved to Sun platforms or disappeared. If Illustra

Initially the Illustra database will be accepted most readily in vertical markets, where

established software developers need to rapidly customize GIS, document management and imaging systems. As these applications move into mainstream corporate applications, Illustra can be added to existing client/server systems as a specialized server. As the market expands, Illustra has the potential to respond to market demands faster than some of its competitors because it is a smaller company with a newer architecture. Illustra should be able to improve performance, develop more interfaces and support new data structures using its underlying object framework.

Illustra needs to enhance its product, using third parties where appropriate to provide:

Superior GUI development tools

- Data Blades to support other structures such as organization charts, full motion video, 2-D and 3-D simulations, multidimensional financial models

- Customization for more vertical applications

- Interfaces to existing application development tools such as Powersoft's PowerBuilder and Microsoft's Visual Basic

Building a system based on Illustra is a risk, but it offers developers an opportunity to:

- Use standard software libraries for complex data type manipulation

- Create new, more powerful applications

- Reduce maintenance costs

- Build on existing SQL expertise

Combining technical innovation with marketing savvy, Illustra offers system integrators and software developers a promising platform. Just a few of the many computer services that can be created using Illustra include online multimedia services, database design and development, information analysis, multimedia library management and map development.

Vendor Profile

December 1994

Illustra Information Technologies

Kay Hart
Director Of Corporate Communications
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Oakland, CA, 94607
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Fax: 510-869-6388

ILLUSTRA

Illustra's Object Relational Database Management System (ORDBMS), the Illustra Server, is an exciting platform for developers of multimedia, financial, document and geographic information systems.

1. Description of Principal Business

Illustra Information Technologies is an emerging database and application development tool vendor. Illustra's ORDBMS stores, manages and analyzes images, video, sound, maps, text and time series, as well as traditional relational tables. It positions the Illustra Server as "the database for cyberspace". Illustra's value proposition is that it provides a superior development and deployment environment for customers who need to research and manage complex forms of information.

Illustra offers system integrators and value-added resellers a significant opportunity to rapidly create new software applications. Illustra markets through both indirect and direct channels. It also works closely with the academic community.

2. Organization

Gary Morgenthaler and Michael Stonebraker, Ingres founders, with Paula Hawthorn started Illustra (as Miro, then Montage) in 1992. Dick Williams, former President of Digital Research, leads a seasoned management team. Paula Hawthorn, V.P., Engineering, from Hewlett-Packard is well-respected in the database community, having worked on early Ingres research. With a strong background in market development, Bruce Golden, V.P., Marketing, helped launch Sun Microsystems in financial and international markets. Steve Maysonave, Senior Vice President of Sales, is also a Digital Research alumnus with extensive OEM, VAR and direct sales experience. Experience from Sybase and IBM is also found in the management team. Illustra has over 60 employees in its Oakland head office. Offices in New York and Washington D.C., focus on financial services and federal markets, respectively. A New Jersey branch office supports other east coast accounts.

3. Client/Server Products and Services

Illustra combines object-oriented technology with that of traditional databases. A major advantage of using Illustra is that it provides integrated development tools for specific data types.

Designed to run in client/server networks, Illustra supports extensions to the industry standard SQL-3 database query language. The architecture is modular. Using a razor and blades analogy, software libraries for supporting specific data types are known as DataBlades. The main advantages of the architecture are that it:
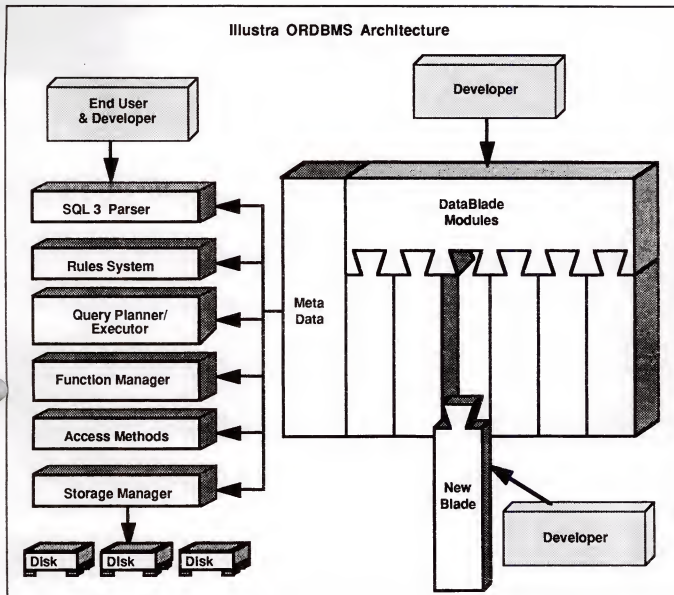
- Accelerates application development

- Reduces the programming required to handle unusual data types

- Provides for reusability of code

Exhibit 1 shows the key components.

The heart of the system is the Illustra Server, the main database engine. Illustra Object Knowledge simplifies display, manipulation and query of multimedia objects. Illustra, either alone or in partnership with a third-party developer, creates DataBlades to support data types that are awkward for traditional databases to handle.

A key feature of Illustra is its support for image management, the Image DataBlade stores, retrieves and manipulates a variety of raster image formats. It is suitable for document images and multimedia system support. Illustra's partners have extended the image handling to support medical images, from diagnostic equipment. A Basic Image Query Datablade will ship shortly to perform single image recognition.

Exhibit 1

Illustra ORDBMS Architecture

For text data, the Text DataBlade manipulates data in 30 formats, including those from word processors. Doc-Tree is a new access method that supports text retrieval using boolean and weighted average searches. It is specialized to handle one to many relationships with word types and can be used for managing clinical records and doctors' notes. The Text DataBlade is complementary to a full-text retrieval system, as marketed by Verity (Mountain View, CA) and Fulcrum (Ottawa, Canada).

The 2D Spatial DataBlade supplies over 100 SQL functions to manipulate over nine different spatial data types like polygon, circle, point and line. A 3D Spatial Datablade supports polyhedra and can be used to support

3D modeling and visualization applications. An example ships with the product that handles AutoCAD files. For example, video can be delivered at 30 frames per second.

The TimeSeries DataBlade can be used to support analysis and management of financial, scientific and retail data. It supports historical calendars and time-series data. For example, it can compare time-series from Wall Street, Tokyo and London financial exchanges that operate on different time-zones and trading cycles.

Illustra is working with MathSoft's StatSci division to produce an S-Plus interface for Illustra. S-Plus is a statistical system that is used by financial services and scientific customers. An Internet Datablade (name still to be determined) is expected to be available shortly to support WorldWideWeb (WWW) servers on the internet.

The Illustra Developer's Program includes server software, two DataBlades and a DataBlade Developer's Kit. The DataBlade Developer's Kit is designed to enable software developers to create their own extensions to Illustra.

A floating license manager enables Illustra to price by the number of concurrent users. When Illustra was first launched the database engine was priced at a low $995 per user and DataBlades were $695 each. Illustra's price has been raised since its initial launch to $1,995 for a single user license. A 10-user Illustra server costs $1,200 per user and in quantity the per-user price falls to $900. This is in line with database pricing trends forced on the relational database industry by Microsoft. Illustra's prices are below those historically charged for mid-range databases. Exhibit 2 gives some representative prices.

Exhibit 2

Representative Product Starting Prices

- Illustra Server for Windows NT - $1,995
- Illustra Developer's Program - $4,495
- DataBlade Developer's Kit - $495
- DataBlades
  - TimeSeries - $1,495
  - Basic Video - $395
  - Text - $795
  - Text Conversion - $395
  - Image - $995
  - Basic Image Query - $395
  - 2D Spatial - $995
  - 3D Spatial - $995

Illustra was designed from the outset to be portable and scalable. Illustra was launched on UNIX systems, with the client software running under X-Windows. Illustra runs on Sun (Solaris Intel and SPARC), Silicon Graphics and Digital platforms. Illustra is moving to support diverse clients including Windows and Macintosh. In addition, a Windows NT version is already shipping.

Milestones for Illustra are shown in Exhibit 3.

Exhibit 3

Milestones

- 1992 - Illustra founded
- 3Q94 - Illustra 2.0 shipped
- 4Q94 - Internet DataBlade announced
- 4Q94 - International version of Illustra released
- 1Q95 - second round of grants to universities for research using Illustra

Illustra 2.0 improves performance, supports 64-bit architectures and optimizes queries better than the original release. It also supports FIPS 127-2 data processing standards.

Illustra has a training and technical support program, together with a creative research grant program. Software updates may be purchased independently of a technical support program on an annual basis. Customers who prefer not to be tied to annual update fees may upgrade when a new release becomes available for 65% of the list price. Exhibit 4 shows support programs.

Exhibit 4

```
+------------------------------------------+
|     Customer and Reseller Support        |
|                                          |
| • Engines for Innovation Research Grant  |
|   Program - enables universities to use  |
|   Illustra for research                  |
|                                          |
| • Standard Support - telephone and       |
|   bulletin board support - 2,500 per yr. |
|   for one primary and one backup person, |
|   additional persons at $4,000 per yr.   |
|                                          |
| • Bulletin Board Support - $3,000 per yr.|
|                                          |
| • Consulting - $1,500 per day plus       |
|   expenses                               |
|                                          |
| • Training Classes - Using Illustra -    |
|   $650 for two days                      |
+------------------------------------------+
```

4. Client/Server Strategy

In an enterprise environment, Illustra's client and server software provides all or part of an application platform. For example, an application may run with a traditional SQL database that interfaces to Illustra. Alternatively an entire application may be built using Illustra. Illustra currently offers interfaces to Sybase.

In early 1995 an ODBC database interface can be expected. This will enable SQL-based GUI development tools, such as Powersoft's PowerBuilder and Microsoft's Visual Basic, to create user interfaces for querying and reporting from Illustra databases.

Initial applications are in image processing, document management, hospital systems, geographic information systems, financial systems and executive decision support. The Illustra database is increasingly moving to support multimedia data mining applications. It is also used in the intelligence community, online services, portfolio management, risk management and derivatives applications.

5. Marketing & Distribution

Illustra is positioned as a distinct alternative to relational databases, such as Oracle, Sybase and Informix, and object-oriented databases, such as Object Store, Objectivity and Versant. Illustra sells databases both directly, to user organizations, and indirectly, through leveraged OEM and VAR channels. Illustra has also found resellers with specific industry knowledge.

Illustra has successfully courted the academic community by offering rewards for creative applications of its software in its Engines for Innovation Grant Program. Research using Illustra covers such applications as:

· Multimedia - libraries, video over the internet

· Medical systems - Knowledge-based systems, 3D brain images, genome analysis

· Geographical and mapping systems - land use, Intelligent Vehicle Highway System data management, climate analysis

· Database management - benchmarks, deductive databases

Illustra places heavy emphasis on supporting indirect channels.

6. Customers

Illustra has approximately 140 installations. Representative customers come from government, computer hardware and software development, health services, financial services and pharmaceutical markets. Illustra sells through system integrators to the government where its technology can be applied to intelligence applications.

The American Board of Family Practice - Lexington, KY - selected Illustra to store multimedia information for recertification of physicians.

Beijing Trisun-Wyse -China - is automating medical records and hospital information systems. This is a joint-venture company set up by Wyse Technology. Wyse will run Illustra on Intel platforms with SunSoft's Solaris operating system. X-Rays and medical images can be combined with traditional patient record data.

NIMCO (formerly National Investment Management) - Milwaukee, WI - is tracking time-series of approximately 3,000 securities over 240 months for a portfolio management system.

7. Partners, Alliances, Ventures

Illustra has porting relationships with hardware manufacturers: Digital, Silicon Graphics, Sun. Its resellers and developers include:

- Fujitsu Network Transmission Systems - for five network management systems,

related to its SONET (Synchronous Optical Network) products

- Fusion Systems Group

- Liant Software - for interfaces to C++/Views 3.0 a visual compiler

- MathSoft - StatSci Division - for statistical software

- SHL Systemhouse - for object-oriented systems integration

- Teknekron Software Systems

- TriTeal Corporation

- TRW - Digital Media Systems - InfoWeb system for analyzing all forms of information from online services, electronic mail and databases

- Visible Decisions - Information Animation - visualization technology for financial services

- Unify - for its VISION user interface development tools to support multiple databases simultaneously

8. Financial Estimates

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Wang, in particular, is actively building partnerships with software vendors, such as Powersoft, Gupta, Microsoft (for Visual Basic controls) and Information Builders, for client/server imaging solutions. For example, Wang is a partner in Powersoft's Client/Server Open Development Environment (CODE) program. The combination of Wang's imaging software, PowerBuilder and a SQL-compatible relational database is more complex to manage and more expensive than Illustra's solution.

GIS Systems

Geographic information systems vendors like Intergraph and its developers present both competition and an opportunity. Many of these vendors have significant investment in proprietary code. Long term they may be more competitive if they move their development to an open platform like Illustra.

Object-relational Databases

Illustra is not the only company to recognize the gulf between object-oriented and

relational databases. UniSQL and HP are often considered competitors to Illustra. Both UniSQL and Hewlett-Packard, with OdAptor, have jumped into the gap with software that connects object-oriented applications to standard relational databases. However, Illustra focuses more on providing development environments for very specific data types, rather than targeting more general object-oriented development environments. For general object-oriented applications that require tight binding with Smalltalk libraries then UniSQL or HP provide more general solutions. However, for a specific application like imaging, Illustra offers richer programming libraries.

10. INPUT Assessment

Illustra has a strong management team, clear vision and solid product architecture. Like most start-ups, Illustra is constrained by its small size and limited access to capital. It is overcoming these weaknesses by partnering with third party developers. Exhibit 5 summarizes its management strengths.

Exhibit 5

Management Strengths

- Understands management of emerging technology companies
- Ability to articulate vision and product differentiation
- Well-balanced, strong development and marketing teams
- Can attract talented engineers through its strong academic ties

Exhibit 6 provides a list of management challenges.

Exhibit 6

Management Challenges

- To keep ahead of established database vendors
- To grow the company fast enough to gain critical mass
- To select appropriate resellers who can both understand the technology and deploy solutions rapidly

Illustra is designed for professional programmers. Its extensible architecture makes it attractive for multimedia applications. Its strengths are described in Exhibit 7.

In many multimedia applications there is a close relationship between creative artist and programmer. Illustra needs to provide modules that enable creative users to build parts of an application on standard PC and Macintosh clients.

Exhibit 7

Product Strengths

- Simplified development environment for spatial and imaging applications
- Ability to add new datatypes
- Integration of data security with objects
- Interchangeable object-oriented components
- Conversion between different data formats
- Modular DataBlades architecture
- Compatibility with SQL
- Wide-range of data types, in particular image, spatial data, text, video and sound

The current programming interface is useful for professional programmers, but is too hard for users who occasionally program. Illustra

lacks an entry level component like Claris's FileMaker that can grow into a fully-fledged commercial database, supported by professional programmers. To be widely accepted Illustra needs to consider broadening the class of programmer that it serves, from occasional users to expert programmers. As a new product, Illustra is continually improving the reliability and performance of its software. Other product challenges faced by Illustra are given in Exhibit 8.

Despite a formidable long term threat from established database vendors, Illustra has a window of opportunity in which it can succeed. To do this it needs to gain market presence in a few key vertical markets and get the major developers and resellers for these markets to commit to its platform.

executes well and sells a standard product at a fair price, Illustra can displace some of the proprietary imaging and GIS software that is expensive to maintain. Illustra may also replace some applications built using a combination of C, C++ or relational databases. It is less likely to replace applications built solely on a single relational database.

Illustra has strong market awareness. It has selected innovative partners that can help it grow, but has yet to attract major commitments from large partners to give it credibility in mature accounts. Illustra has concentrated on gaining development partners and resellers. It needs to add more business partners that can finance its growth in vertical markets. Exhibit 9 summarizes Illustra's marketing strengths.

Exhibit 8

Product Challenges

- To keep interfaces and supported formats up to date
- To provide high-performance for multimedia
- To keep ahead technically
- Ensure product is robust and industrial strength
- To embrace OLE and OpenDoc to interface with PC application packages
- To broaden the range of platforms supported
- To create interfaces to legacy data

Exhibit 9

Marketing Strengths

- Ability to carve a unique position in a fragmenting database market
- Understands OEM and VAR channels
- Strong positioning and public relations
- Illustra Developer's Program
- Relationships with leading UNIX hardware manufacturers

Exhibit 10

Marketing Challenges

- To gain stronger LAN and PC market presence
- To find markets where multimedia has a strong economic justification
- To avoid being crushed by major database vendors like Oracle, Sybase, Informix and IBM

Illustra faces similar marketing challenges to those experienced by Sun Microsystems when it started. Sun faced competition from an installed base of proprietary workstation vendors, but believed that it could replace the installed base more cost effectively. Over time many of the hardware vendors like Daisy, Valid Logic and Computervision moved to Sun platforms or disappeared. If Illustra

Initially the Illustra database will be accepted most readily in vertical markets, where

established software developers need to rapidly customize GIS, document management and imaging systems. As these applications move into mainstream corporate applications, Illustra can be added to existing client/server systems as a specialized server. As the market expands, Illustra has the potential to respond to market demands faster than some of its competitors because it is a smaller company with a newer architecture. Illustra should be able to improve performance, develop more interfaces and support new data structures using its underlying object framework.

Illustra needs to enhance its product, using third parties where appropriate to provide:

Superior GUI development tools

· Data Blades to support other structures such as organization charts, full motion video, 2-D and 3-D simulations, multi-dimensional financial models

· Customization for more vertical applications

· Interfaces to existing application development tools such as Powersoft's PowerBuilder and Microsoft's Visual Basic

Building a system based on Illustra is a risk, but it offers developers an opportunity to:

· Use standard software libraries for complex data type manipulation

· Create new, more powerful applications

· Reduce maintenance costs

· Build on existing SQL expertise

Combining technical innovation with marketing savvy, Illustra offers system integrators and software developers a promising platform. Just a few of the many computer services that can be created using Illustra include online multimedia services, database design and development, information analysis, multimedia library management and map development.

Company Profile

USoft *INPUT LIBRARY*

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USoft

The Server/Client Software Company

USoft is a well financed, emerging vendor of client/server or, as it prefers to describe them, "server/client" application development tools. This profile reviews its products, strategies and market opportunities.

1. Principal Business

USoft was announced in February 1995 to sell comprehensive software tools for planning, building and managing server/client solutions. It calls itself "The Server/Client Software Company," reflecting its server-centric approach to enterprise application development. The company started with $50M in funding from Unisys.

2. Organization

Mike Seashols, President, searched the world for an acquisition candidate with top quality tools, a substantial installed base and satisfied customers. He found it in Topsystems, a Netherlands-based development tools company. It was while consulting for Unisys that the opportunity arose to set up a software

subsidiary to create state-of-the-art development tools and platforms.

Mike was Oracle's first Vice President of Marketing and Sales, after spending ten years at IBM. He then moved to Ingres and went on to be a founder of object-oriented database vendor Versant Object Technologies. Besides Oracle, Ingres and Unisys, USoft draws on management talent from Sybase, Uniface, IBM, Andersen Consulting and Versant. Max ten Dam, a co-founder of TopSystems, will head the European operations. Robert Reiber, USoft VP of Product Development, comes from Unisys, where his strategic planning for new software businesses led to the establishment of USoft. The TopSystems organization and staff will remain, being augmented by additional development, support and sales staff.

3. Products and Services

USoft's application development tools are designed for enterprise systems and span multiple client and server architectures. USoft supports standard databases such as Sybase, Oracle, CA-Ingres and Informix. It also supports Microsoft's ODBC standard, which enables it to connect to many other databases, including SQL Server. ODBC interfaces also enable applications generated with USoft to support client applications like Microsoft Excel and PowerBuilder. USoft is focusing on UNIX, Windows and Windows NT platforms. USoft also supports database access on Unisys' systems.

Reengineering and database conversions are supported by USoft. For example, USoft converts Oracle/SQL*Forms to Windows forms.

Exhibit 1 shows the main components of USoft's software. USoft describes its tools as "server/client" because they are based on the *USoft Server/Client Repository* that can be partitioned across systems. A repository is a storage location for objects, rules and definitions. Just as a data-dictionary provides information about data elements in a database, a repository provides information about a development environment. The advantage of a repository-based approach to client/server computing is that software components can be specified centrally and then used consistently throughout a corporation, enabling reuse, higher productivity, faster development and evolution.

USoft Analyst supports development of a business model that can be used as a foundation for an application. It is particularly useful for defining processes and transaction routing.

USoft Developer enables developers to create an information model of their business, then to develop screen designs and rules. It incorporates a style guide to ensure consistency of user interfaces and objects across the enterprise. USoft Developer includes the Server/Client Repository. It also includes Diagrammer, a tool for representing the information model, Definer, a tool for defining the model, and Authorizer, a tool for adding security levels to an application.

USoft Batch supports batch interfaces to systems. Applications can be built that support batch processing as well as interactive user sessions. Despite the increase in client/server computing, batch systems are still very much in use for bulk data transfers, off-peak operations and inter-organizational transactions.

Interfaces to Oracle, Sybase, ODBC tools and Oracle Forms are provided by *USoft Extended Oracle, USoft Extended Sybase, USoft ODBC Driver* and *USoft Forms,* respectively.

USoft Online manages two-phase commit to ensure transaction integrity when updating databases that are replicated across different servers.

USoft Bridge provides links to CASE tools. Developers can select their own CASE tool for project design and systems analysis. Sterling Software's ADW, Intersolv's Excelerator, LBMS's Systems Engineer and Oracle CASE are some of the CASE tools supported.

USoft Workflow Manager enables application developers to route tasks according to priority, promote cooperation between users and balance workloads.

Exhibit 1

Major Components Of USoft's Software
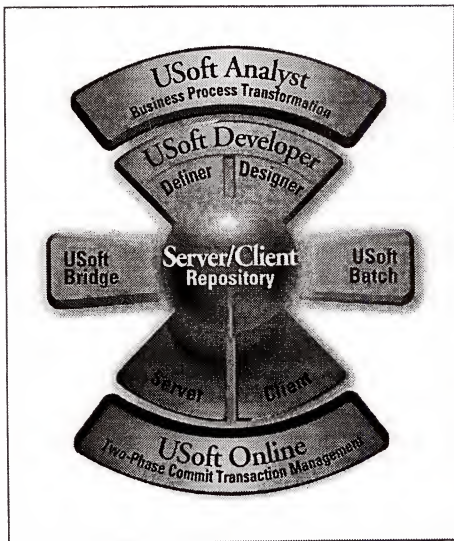
Source: USoft

The *USoft Method* is a six-phase cyclical approach to programming that is designed to foster interaction between developer and user. A key component is the Rules Definition phase that reduces lower-level coding. Besides rapid application development, USoft Method supports rapid application maintenance, providing the developer with tools for release preparation and final sign-off.

4. Strategy

USoft provides visual development tools that enable users to customize their own screens. Whereas many early client/server tools focused primarily on screen design and user interface features, USoft recommends that customers focus initially on solving business problems using the server architecture. Users can then customize their own screens as the application is completed. This reduces the load on application developers and enables users to create the features that they really need. This reflects a general industry trend towards modeling business processes using objects that are the foundation of enterprise applications. Another trend reflected here is that of a software designer designing the most common features and leaving users to add more specialized ones as they need them.

5. Marketing and Distribution

USoft is spending considerable effort in training Unisys' sales and support staff to enable that channel. In addition to marketing through Unisys it will also have its own indirect and direct sales channels. Unisys will continue to market its own software products such as Mapper and LINC. Mapper is designed as a user tool for creating decision support applications, based on a 4GL. LINC, like USoft, is repository-based. However, LINC is designed primarily for Unisys proprietary platforms, whereas USoft offers a more modern cross-platform approach.

USoft's software, while applicable to any industry, is currently installed in financial, telecommunications, insurance, health services, government, transportation, oil & gas, distribution and publishing markets. This fits well with Unisys' business units for financial services, the public sector, transportation, telecommunications and health information management.

USoft is targeting Fortune 1000 customers that are transforming their application development environment. Many are using USoft to help re-engineer their business processes. PowerBuilder users that want to extend their systems and standardize business rules and screen designs are typical customers.

6. Customers

USoft has 250 customers worldwide. In Europe they include Lloyd's Bank, NEC (UK), Compaq (UK), Reed Elsevier Publishing, Philips Electronics and the Scottish National Health Board. In the U.S. Texaco, NEC, the Commonwealth of Virginia, Commercial Life Insurance and Cominco are representative customers.

A large engineering company benchmarked Powersoft's PowerBuilder with USoft's software. An experiment revealed that a single programmer in three hours using USoft could achieve the same as two Powersoft programmers did in 3.5 days. Whereas programmer productivity is highly correlated

with programmer expertise, the experiment revealed some interesting differences in development approach. The USoft programmer generated the application from a central design, whereas the Powersoft programmers spent time designing screens. The screens included bitmaps as well as data fields.

The experimenters additionally noted that USoft code was easier to maintain.

7. Partners, Alliances, Ventures

USoft's main focus is on its partnership with Unisys. USoft has initially been capitalized by Unisys at $50M. USoft intends to grow by acquisition, as well as by leveraging Unisys' considerable sales and marketing staff, and other indirect channels.

USoft needs to cultivate application developer relationships and to work closely with the major system integrators. It may find some difficulty in penetrating accounts where significant commitments have been made to alternative development platforms, even if they are not as efficient.

8. Competitive Position

USoft wants to position its product as being industrial strength, for the enterprise, yet at the same time flexible. It also claims to be maintainable and contribute to development productivity. USoft is committed to open systems, i.e., Windows, Windows NT and UNIX. USoft provides Unisys' customers with alternatives to its older Mapper and LINC product lines. Whereas Unisys is a significant

open systems hardware platform provider, its software products are aging and not recognized as open. USoft provides Unisys with the opportunity to be a major open systems software development platform provider.

A key feature of USoft's software is that the rules and objects provide a rich programming environment. This saves developers from creating C++-based Windows Dynamic Linked Libraries (DLLs). These are often linked to tools like Powersoft's PowerBuilder or Gupta's SQL-Windows to fill out the functionality.

USoft as a development tool competes indirectly with many other products, however its server-centric approach makes it not unlike Easel's Object Studio. Unlike Object Studio, which is Smalltalk-based, USoft is based on C++. Also USoft has more emphasis on access to legacy systems and batch processing interfaces. The biggest competitive threats may come from other small vendors that are acquired by larger companies. For example, Easel has been acquired by VMark, a multi-dimensional database vendor. If VMark were to be acquired by a larger company Object Studio would be a more serious competitor.

USoft also competes with Dynasty and Forté in that it can be used to build enterprise systems that can be partitioned across multiple clients and servers. Clearly USoft has greater resources than either of these companies. Also its installed base of 250 customers is larger. Long term Forté could be a significant competitor, although it focuses more on applications that pass information between users, rather than on transaction-based systems.

Oracle's CDE and Informix's New Era are competitors in that they can be used to build enterprise applications. They are marketed by the database vendors and their partners, hence are likely to find popularity with customers that want to buy their development tools and database from a single source.

Gupta's SQL Windows, Powersoft's PowerBuilder and Microsoft's Visual Basic are representative of competitive products that focus on the client part of an application more than the server. Using ODBC interfaces they may be integrated into enterprise applications using USoft.

9. Outlook

USoft has a promising strategy and can be expected to acquire companies in the connectivity and middleware areas to round out its portfolio of products. It needs to attract more third party developers and vertical market application software developers to expand its installed base rapidly.

10. INPUT Assessment

The management team is strong, experienced and global. It is being rapidly assembled.

Exhibit 2

Management Strengths

- Experienced at growing companies rapidly
- Excellent knowledge of enterprise database markets
- Can leverage Unisys resources
- Ability to articulate company direction

USoft's key challenge will be cultural. USoft's executive team has to be able to bridge the culture of Unisys with that of an entrepreneurial Dutch company, as well as with its own growth-oriented culture. USoft is well aware of the challenge and is making an aggressive effort to ensure that the strengths of each culture are leveraged. It is for example making a strong investment in training Unisys personnel to ensure that the channel has significant resources in place for success.

Another challenge will be to manage growth. When Unisys announced USoft in the Wall Street Journal, the response from the market, including Unisys customers, was strong. USoft has to be able to manage customer expectations and ensure that it can hire quality personnel fast enough.

Another management challenge will be to position USoft as a leading independent software vendor, yet at the same time make it a successful Unisys subsidiary. IBM and Apple, are two hardware companies that have managed to grow successful software businesses, but these have not been without difficulties. IBM has had trouble in getting users outside its installed base to perceive it as a leading database vendor, even though its DB2 database product line runs on other platforms, such as Hewlett-Packard's HP-UX. Apple subsidiary Claris was a long time in supporting FileMaker for Windows, which has significant market share as a personal database on Macintosh hardware.

Exhibit 3

Management Challenges

- Managing growth
- Hiring quality personnel
- Managing customer expectations
- Creating the perception of being an open systems software supplier

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Exhibit 4

Product Strengths

- Users can modify applications
- Ease of maintenance
- Promotes enterprise standards for user interfaces, business tools
- Supports re-engineering and information modeling
- Generates application from models
- Central repository promotes code-reuse
- Supports CASE tool interface standards

USoft's software has a strong architecture. It is particularly attractive in that its information base, objects, methods and rules make it unlikely that a programmer will need to understand a third generation language like C++ or Smalltalk to build an enterprise application.

As yet there are no standards for rules-based application development tools. Intellicorp and other rule-based tool vendors have been constrained in their growth, in part because their approach was non-standard. USoft has more modern tools and they are relatively straightforward for a programmer to grasp, nevertheless whenever a new development environment has to be learned it presents a barrier to product acceptance.

Whereas USoft supports Windows and UNIX client platforms, it does not support DOS, OS/2 or the Apple Macintosh environment. Apple Macintosh support has helped products like ParcPlace's VisualWorks application development tool gain acceptance.

Scalability to low-end systems is not a feature of USoft. This may not matter as it can be integrated with low-end tools like Excel that support ODBC. USoft may consider acquiring a company with personal databases to broaden its product line.

USoft is able to leverage Unisys's public relations and advertising efforts. This is a tremendous advantage to an emerging company. USoft has credibility because its current customer installed base is sizable for a recent entrant into the client/server market and it is backed by a large corporation.

USoft's Server/Client terminology helps position it apart from the many client/server tool vendors. This creative approach to marketing and positioning will help its adoption by enterprise developers. It has also

differentiated itself from client/server tools like Informix's New Era by emphasizing its flexibility, server focus and wide range of systems supported.

Exhibit 5

Product Challenges

- Proprietary rules-based approach
- Lacks Macintosh, OS/2 and DOS client support
- Does not scale to single user platform

USoft understands leverage. It is working hard to market through Unisys with strengths in financial services, telecommunications and government. USoft understands what it takes to train a reseller like Unisys.

Exhibit 6

Marketing Strengths

- Strong resources from Unisys
- Credibility
- Server/client terminology is a differentiator
- Ability to leverage relationships

USoft may face a shortage of trained developers. By using corporate marketing channels, USoft lacks a cottage industry of programmers as is found in the Visual Basic market. These independent programmers provide a ready pool of contract programming resources for a system integrator. USoft needs to seed the developer market with low-end versions of its tool so that a body of programmers emerges that is familiar with its rules, objects and methods.

Exhibit 6

Marketing Challenges

- To train and support programmers
- To define a strong position in a crowded market for development tools
- To displace alternative development tools in application software companies and system integration firms

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In summary, USoft has a promising opportunity with Unisys. To succeed it must gain more indirect channels such as major system integrators. Its main challenges are in attracting software developers, acquiring appropriate companies and positioning itself in a fast growing, but crowded market.

Company Profile

Object Design, Inc.

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Object Design, Inc. (ODI) is a market leader in object-oriented databases. This profile outlines the products, services and support offered by ODI.

1. Principal Business

ODI's strategy is to provide software and services to store, manage and distribute object-oriented data. ODI licenses OODBMS (object-oriented database management system) software directly and through resellers. It provides training and support services, relying on partners where possible.

2. Organization

ODI was founded in 1988 by Thomas Atwood, who is now chairman of the company. Atwood also founded ONTOS (formerly Ontologic), one of the first object-oriented database companies. He has a research background from Digital in object-oriented technology and has been able to attract a strong engineering team. Kenneth Marshall, CEO and President, is an economist with a background that includes sales and divisional management at

Oracle. The company's 270 employees are located in its Burlington headquarters, 11 U.S. offices and in five international subsidiaries. Approximately 75 people are in engineering, 20 in marketing, 140 in sales and 25 in finance and administration. Of the 140 in sales, about 60 are in technical support, sales support and consulting.

3. Client/Server Products and Services

The company's flagship product is *ObjectStore Server*, an object-oriented database. ObjectStore 4.0, the current release, is a distributed client/server database. Its functionality is constantly being extended. An early application of ObjectStore was to provide persistent storage for C++ programmers. It can be used to store objects created by application developers in C++ or Smalltalk, but more importantly can interface to file systems, video servers, document storage systems and traditional databases to integrate data from disparate systems.

ObjectStore runs on LANs based on Windows, UNIX, OS/2 and Windows NT operating systems. ODI has a Netware product, but demand for it is gradually diminishing.

ODI has integrated many C++ objects and libraries with ObjectStore as well as a data manipulation language. Many of the features added to ObjectStore are similar to those found in relational databases, like concurrency control for client/server applications, backup, recovery and archive logging. Concurrency control has been a feature from the beginning.

An object can reside in the database (a persistent object) or in memory (a transient object) and this is transparent to the application code. The same application code runs on persistent data as it does on transient data with no loss of performance. Features that ObjectStore offers to developers include:

- Virtual Memory Mapping Architecture extends virtual memory to provide persistent memory storage for objects, in the same way that virtual memory extends physical memory for general purpose computing.

- Multi-threading with inter-thread locking to serialize client interactions with the server

- Online Backup provides full and incremental database backup and restore.

ObjectStore is a cross-platform database that runs across client/server architectures. Different parts of the database may run on different operating systems.

ObjectStore lets developers with C programs that store data in files, convert the files to ObjectStore objects and interface them to C++ and Smalltalk applications

ObjectStore supports querying of objects, for example relationships between objects can be determined.

ObjectStore works with a variety of third-party development tools such as ParcPlace's VisualWorks. Plans to support IBM's object infrastructure (SOM/DSOM) are underway. ObjectStore also works with multiple compilers, providing interoperability between different application development environments.

ObjectStore uses a floating license manager to limit the number of simultaneous users. Pricing is per seat, from $3500 per user, depending on platform, number of seats purchased and number of sites supported. Applications require a runtime license.

ObjectStore Component Architecture is ODI's blueprint, with ObjectStore Server being a key component. Other components include:

- ObjectStore Smalltalk Client
- ObjectStore SQL Client
- ObjectStore C++ Client
- ObjectStore Gateway

ObjectStore is evolving from a storage system, to a distributed client/server platform. ObjectStore Smalltalk Client, ObjectStore SQL Client and ObjectStore Gateway components are expected to ship by the second half of 1995.

4. Client/Server Strategy

ObjectStore may be used to provide object storage for an application running on a single system. Alternatively it may be used in two and three tier client/server architectures. In a two-tier system, ObjectStore is a server database that can be accessed by client software. A three-tier architecture is shown in Exhibit 1.

Exhibit 1

Three-tier Architecture for Enterprise Systems
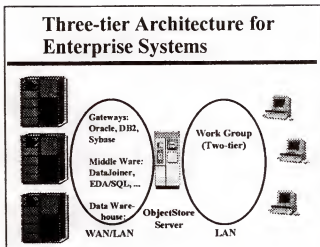
ODI's client/server strategy is to provide an object-oriented database that is

cross-platform, supports component software and interfaces to legacy systems.

5. Distribution

ODI sells its software directly and through OEMs and resellers. It has over 100 VARs, systems integrators, application development tool vendors and OEM systems vendors supporting its products.

It has wholly-owned subsidiaries in the UK, France, Germany, Japan and Australia. It has distributors in Switzerland, Spain, Portugal, Sweden, Norway, Finland, Italy and Israel.

6. Markets and Customers

ODI's customers are programmers, both in systems development companies and in major corporations. As part of the evaluation process, ODI helps customers benchmark ObjectStore for their application.

An early market for ODI was engineering, followed by software development. Approximately 33% of ODI's revenues come from the telecommunications market. Many telecommunications systems are written in C++, providing a good fit for ObjectStore. Representative markets and customers include:

- Telecommunications: Ameritech, AT&T, Ericsson, MCI, Siemens Telecom Public Networks, Telstra (Australia Telecom), Telefonica de Espana, US West
- Utilities: Northwest Natural Gas
- Science and engineering: Boeing, Cadence, ChemShare, Lockheed Martin
- Finance and services: Chemical Bank, Fidelity Investments, Price Waterhouse, SIAC

- Manufacturing: AT&T GIS, Avanti Systems, Goodyear, HP, IBM, NEC, Texas Instruments

Australia Telecom uses ObjectStore for call routing and delivery services in its Advanced Intelligent Network(AIN). *Ameritech* uses ObjectStore for trouble-shooting switches, billing analysis, call tracking and system load balancing. Other telecommunications applications include network management, fraud analysis, GIS and CASE.

Northwest Natural Gas uses ObjectStore for its customer information system that will be used by over 200 customer service representatives. *Chemical Bank* is using ObjectStore in trading systems.

Applications that are compute intensive, rather than throughput bound are candidates for ObjectStore. ODI has about 1,100 customers and an estimated 10,000 developer seats worldwide.

7. Partners, Alliances, Ventures

ODI's main OEM customers are IBM, Sun, AT&T GIS, Cambridge Technology Partners, Expersoft, Microsoft and Price Waterhouse.

IBM is reselling ObjectStore as part of its VisualWarehouse meta repository and in workflow products. IBM is a key distribution channel for ODI. IBM is also a strategic investor, as well as an internal user of ObjectStore for engineering and sales applications.

Sun's SunSoft division is using part of ObjectStore to provide persistent storage for its Distributed Objects Everywhere (DOE) environment.

AT&T Ventures is an investor and AT&T GIS is using ObjectStore for several applications,

particularly for C++-based systems in telecommunications.

Digital Equipment is using ObjectStore for 64-bit applications on both Digital UNIX and Open VMS platforms and, like IBM, is using it internally to support sales.

Several software developers incorporate ObjectStore as a product component. *Evolutionary Technologies* is incorporating ObjectStore into its EXTRACT Tool for data warehousing applications. *Indus Consultancy*, a financial services systems integrator, is using ObjectStore to store objects used in financial systems. Rogue Wave software, a leader in C++ libraries, is supporting ObjectStore with its Tools.h++ product.

Expersoft will integrate its distributed object management environment, XShell with ObjectStore. *IONA Technologies* has announced that its Orbix object request broker will integrate with ObjectStore. ObjectStore is expected to be a key component of systems that use the Object Management Group's CORBA (Common Object Request Broker Architecture) to integrate distributed systems.

ODI is working with ParcPlace on seamless Smalltalk interfaces to VisualWorks, its client/server application development tool. ParcPlace has re-engineered its underlying engine to integrate its software with ObjectStore. This makes ObjectStore load Smalltalk objects quickly. For example, ObjectStore can quickly load objects that contain data from legacy applications.

8. Financial Estimates

ODI's 1994 calendar year software license revenues were $27.6 M worldwide of which $19.3M was in the U.S. In 1994, 60% of

revenues were from direct sales and 40% were reseller and OEM channels.

In 1993, IBM made a substantial investment in ODI that has been estimated by the trade press at $27 M. A subsequent round of financing in 1994 raised $7 M from other investors, including AT&T. Other industrial investors include Kodak, Intel, Olivetti and Philips. Venture capital investors include Harvard Management's Aeneas Fund, The Vista Group and Orien Ventures. Total outside investment amounts to $37.4 M.

9. Competitive Position

ODI's competitive advantage over traditional databases is access speed and the ability to store non-traditional data, like C++ and Smalltalk objects. Customers typically choose ObjectStore because they need to deploy and modify applications quickly and easily. Cutting edge industries with computationally intensive applications are where ODI wins over traditional database vendors.

ODI's competitors and potential competitors in the database market include:

- Object-oriented database companies: ADB (Matisse), NeoLogic, ONTOS, Poet, Raima, Servio, Versant

- Object-relational database companies: HP, Illustra, UniSQL

- Traditional database vendors: Informix, Oracle, Sybase

Among the object-oriented database vendors, *Poet* and *NeoLogic* are aimed more at PC developers.

Versant is the closest competitor. Informix chose Versant as the repository for objects in its NewEra object-oriented development tool.

Versant competes with ODI primarily in telecommunications markets where it is used for network management. Versant, unlike ObjectStore, does not rely on the virtual memory of the underlying operating system for performance.

Gemstone (previously Servio) is the leading OODBMS for Smalltalk developers. As ODI rolls out its integrated interface to ParcPlace's VisualWorks the gap between ODI and Servio in Smalltalk markets will narrow.

Raima competes with ObjectStore in markets where C++ developers need persistent storage. Raima has a less complete solution than ODI, but it provides a royalty-free runtime package in its low-end product. The company has had financial difficulties recently.

Sybase is the leading competitor to ODI in financial services markets, even though it markets an RDBMS, not an OODBMS. *Informix's* NewEra and *Oracle's* CDE application development tools handle objects, but these are more suitable for supporting applications that can store data in rows and columns. They are not designed to store C++ objects persistently in the same way as ObjectStore.

Illustra stores both objects and relational data, but its competitive advantage lies in its libraries for specific data types, such as time-series, images, multimedia documents and spatial data. ODI can expect more competition from Illustra in financial services markets as the latter's technology matures. ODI is targeted more for the 3GL C++ language developer whereas Illustra is for the 4GL SQL developer. *HP* and *UniSQL* provide products that link C++ applications to relational databases. These are focused more on connectivity than on storage, which is ObjectStore's strength.

ONTOS once had the marketing presence of ODI, but fell behind. Initially it was not focused on the C++ developer like ODI, rather it had its own language. It does not leverage the strengths of partners as successfully as ODI.

Matisse has very high performance, particularly for real-time monitoring of large systems, such as those found in nuclear power stations. It is more specialized for vertical applications than ObjectStore.

Unlike some of its competitors, ObjectStore stores objects, not the methods that act on the objects. It does not execute methods inside the database like ADB's Matisse and Servio's Gemstone.

10. Outlook

Are object-oriented databases poised for the massive growth that relational databases saw in the mid-80s? Will object-oriented vendors displace relational database vendors?

INPUT believes OODBMSs have a significantly different role from RDBMSs. Relational databases support data that maps easily to rows and columns. Forms, tables and columnar reports will continue to be handled by traditional databases. Object-oriented databases are better for handling data that cannot be easily represented by rows and columns. Besides supporting persistent storage of objects, OODBMSs are useful for:

• network management applications

• scientific, engineering & financial modeling

• bills of materials and component integration

• storing data about systems - meta data

Since the architecture of ObjectStore relies on virtual memory it is particularly useful for applications that need to operate on data that can be held in memory at one time, as opposed to data that needs to be swapped in and out of memory. It is useful for storing engineering data, where related objects can be stored in close proximity. For example, in a car design all the parts related to the engine may be stored in one area of the database.

ObjectStore is less good for analyzing transaction databases where there are many records and the database needs to find one element from each record. For example, in a banking application to search through a database of checks and find all items with amounts over $1000 would require the amount field only on each record to be analyzed.

11. INPUT Assessment

ODI has built a balanced team with the ability to raise capital, promote aggressively and develop technically advanced software. The management team is successfully positioning ODI as a leading component software vendor in the long term. ODI is tenacious in pursuing leading vendors, such as IBM, as OEM partners.

Exhibit 2

Management Strengths
• Strong object-oriented engineering expertise
• Technically astute, aware of programmer needs
• Balanced team
• Energetic, creative
• Tenacity

ODI has chosen to go for market share rather than short term profitability. Its challenge in the future will be to rely less on investors and

more on revenue generation. ODI has to constantly focus on customer requirements. With a product primarily for programmers, ODI has a challenge to address customer priorities. If it listens to its existing customer base it will limit its market and not be able to reach less sophisticated programmers.

Exhibit 3

Management Challenges
• To grow the company profitably
• To focus on customer requirements

ObjectStore is used primarily by programmers to provide persistent storage, that is to store objects after the processes that used them have stopped executing. Underlying ObjectStore is an engine that can be ported to different environments. This enables ObjectStore to run across different platforms.

Exhibit 4

Product Strengths
• Scalability
• Performance, multi-threading
• OS/2, UNIX, Windows, OpenVMS support
• Integration with C++ and Smalltalk
• Support for high-availability computing
• Strong support and documentation

Compared with Illustra, who has focused its database on key product categories, ODI prefers to market a more general solution that can be addressed by a wide range of applications that use C++ and Smalltalk. This is a strength because it appeals to a wide range of application developers, but it is also a weakness because it cannot attract high-level developers. Object Design needs to ensure that partners build high-level interfaces for specific applications so as to broaden its acceptance among user groups and casual

programmers. Its Smalltalk initiative is customer driven and will help it reach a broader market. The online analytical processing market (OLAP), is another area where ODI could add value to popular packages like Microsoft's Excel spreadsheet.

Exhibit 5

Product Challenges
• To integrate specific tools for niche markets
• To support higher level programmers
• To keep up with performance
• Royalty-free runtime solutions

ODI lacks a royalty-free runtime solution at the low-end. This will become important if it is to deploy its technology in software products. It needs to consider taking a layer of its ObjectStore technology and making a runtime version that can be used by application developers. Without such a pricing structure, Raima and others will satisfy some of the entry-level market for C++ persistent storage.

ODI has strong marketing, with an understanding of the vertical markets it has selected like software engineering, telecommunications, software development, manufacturing and financial services.

Exhibit 6

Marketing Strengths
• Public relations
• Vertical marketing
• Direct marketing
• Product planning

ODI tends to launch its products early as they are sold into the developer community and it needs to get feedback quickly to make its products robust. Developers that expect a

finished product for an early release may be disappointed, but for those that need to test the product early ODI has strong support.

ODI is strong in partnering, for both applications development and professional services like training.

Exhibit 7

Marketing Challenges

* To find new markets by understanding niches where it has had success

* To ship reliable products quickly after they are announced

* To convey to a wider spectrum of developers the strengths of using object-oriented database technology

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ODI needs to find new markets. One way to do this is to subdivide markets in which it is already active so that it can gain critical mass. Logistics and publishing are two markets that ODI is not addressing that have applications that could use the technology. The former market tends not to be leading edge, the latter is a financially weak market, better suited to products like Lotus Notes. However, with appropriate partners that can provide compelling solutions, ODI could overcome the weaknesses of these markets.

Company Profile

October 1995

InPower

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***i*
InPower

InPower is an independent provider of client/server systems. This profile outlines the products, services and support offered by InPower for human resources (HR) software. It also discusses Integral Systems, that helped start InPower, to provide a background for this assessment.

1. Principal Business

InPower's strategy is to create and market client/server software for HR and payroll applications. In July 1995, Integral Systems, a leading human resources software vendor, formed InPower as a separate company to focus on client/server.

Integral started by consulting and designing custom HR applications in 1972. InPower has 175 employees.

It has evolved into a product company, acquiring and developing software, while continuing to sell services. Its focus is now on mainframe HR and financial solutions.

CLSP

2. Organization

Michael Green who, for the last two years, headed customer service and marketing at Integral heads InPower. Its staff is populated mainly by ex-Integral employees. Recently, Steve Knowles joined InPower as VP Marketing from a vendor of application development tools, Business Objects. Earlier in his career Steve was Director of Interoperability Solutions at Sybase.

Roxanne Paras, VP Client Services, manages four business units staffed by approximately 75 people who provide education, consulting, client management and technical support services for InPower's domestic and international clients. Roxanne has 10 years of HR management experience, directing HR, payroll and benefits. She has also extensive implementation consulting experience with a variety of software vendors.

Robert Trepper directs InPower's domestic and international sales and sales support operations. He came to InPower from Syntellect, a provider of voice processing solutions in 1993, where he served as VP of North American sales. From 1997 to 1990 he was Director of Sales and Marketing at TRW Financial Systems. He has 24 years of sales and customer service management experience in high technology industries.

John Eckstrom, InPower's VP of Product Development joined the company in August 1995, having been VP Client/server Development at Bank of America. Before that he was at TRW Financial Systems, a leader in financial document image processing.

Lee Klein, VP Business Planning, manages InPower's internal processes and overseas

strategic decisions for products and services. Formerly VP of applications development, Klein managed the on-going design, development and introduction of the InPower Series, model-based client/server applications. She managed the design of relational database management systems for InPower and guided a group of business analysts and C/S engineers in capturing best business practices for the HR arena.

William Leckonby, who came from Tesseract to be Integral's CEO in 1993, is on InPower's board. Currently InPower operates out of the same premises as Integral. The goal is to move it into its own premises in early 1996. It will then operate separately from Integral.

3. Client/Server Products and Services

The InPower Series has two application offerings — InPower HR and InPower Pay. These products run on Sun, IBM and Hewlett-Packard servers. Client machines are IBM-compatible PCs or Sun workstations.

InPower supports a range of databases, primarily Oracle and Sybase, with DB2, Informix and ODBC databases as alternatives.

InPower HR supports:

- Staffing
- Total Compensation
- Work Force Development
- Labor
- Work Environment
- Structures Management

InPower Pay supports payroll processing. It is designed for corporations that want to do their own payroll processing, rather than offload it to a bank or processing services company, like ADP.

InPower provides supporting development tools — InPower Tools and InPower Models — that enable developers to encode business rules and organize workflow. InPower has taken the best business practices for HR and incorporated them in its product line. Companies can compare their business practices to those recommended by InPower.

InPower Tools is a visual development tool that enables both users and IS staff to customize their software. The IS staff can determine which users are enabled to change the appearance of their code using the tools.

InPower Models are designed to support business process reengineering (BPR) and enable corporations to map the flow of information.

InPower resells Crystal Report Writer from Crystal Reports. This popular client/server report writer enables reports to be easily customized by users.

InPower's tools are chosen by companies that want an integrated CASE methodology. They are particularly useful to companies that are reengineering their processes. Workflow is built into InPower's software, enabling HR information to be processed depending on events such as an employee's hiring or promotion. InPower integrates its tools with Integral's mainframe software to provide "blended solutions". InPower pricing starts at $195,000.

4. Marketing & Distribution

Sales are direct. InPower wants to own its customers and be close to them. The role of professional services and consulting firms is to help customers reengineer their HR systems. Professional services firms engaged in BPR refer leads to the InPower sales force, rather than reselling Integral's code.

InPower sells a cross-industry solution and is not specializing in vertical markets. However, InPower recognizes that different markets have different needs and the flexibility of its software design means that software can be adapted readily to meet new market requirements. InPower's installed base spans manufacturing, retail, oil & gas, health services, financial services, transportation and government.

5. Customers

Integral has traditionally been a player in the mainframe market, just below the largest companies. Integral has 1800 customers worldwide. InPower has 25 customers/installations.

InPower's main customers are companies wanting to move their HR applications off a mainframe and reengineer their business processes. Some customers choose to keep their payroll on mainframes to simplify security, but to want InPower HR to move information to user PCs.

The typical InPower customer wants to have a client/server HR solution and reengineer associated business processes. BPR is typically carried out by professional services firms like KPMG and Price Waterhouse who then provide the customer with a choice of HR packages. When InPower's software is

selected, the InPower sales representative sells directly to the customer.

To create new features, InPower uses JAD (Joint Application Development). Groups of customers are shown prototypes of new features. They then help select those that are included in new product releases.

DHHS - The Department of Health and Human Services has chosen InPower because of its ability to reengineer business processes and flexibility. DHHS will help InPower market solutions to the government, being the first customer to customize the software for government hiring processes. DHHS will also provide a help desk and demo center for InPower to support other government agencies.

Alcoa has selected InPower's software in its Knoxville plant to manage data on 6000 employees using InPower HR and InPower Tools. The system runs on HP 9000s with an Oracle relational database and server at Alcoa's Pittsburgh, PA headquarters. A

6. Partners, Alliances, Ventures

Integral has historically worked with large services arms of accounting firms to promote its products. This works especially well for InPower in accounts that are reengineering their business processes.

InPower currently has four large professional services firms trained in its software.

KPMG Peat Marwick LLP was InPower's first strategic alliance, announced in 2Q95. KPMG is focusing on government and higher education markets. KPMG can complement InPower's solutions by providing financial

software that is installed in over 200 government and higher education accounts. KPMG and Price-Waterhouse are examples of Premier Partners that recommend InPower as an HR systems vendor.

The Systems Consulting Group and Booz, Allen and Hamilton are other partners. Booz, Allen and Hamilton is working with InPower on the DHHS account. Eight representatives from Price Waterhouse, KPMG and Booz, Allen have received InPower training.

7. Financial Estimates

InPower does not disclose financials, but with 25 customers paying an entry price of $200,000, INPUT estimates 1995 revenues of under $10M for InPower. InPower can be expected to grow at least 40% annually over the next two years.

8. Competitive Position

InPower is chosen by companies that want a business modeling tool integrated with their HR software.

Its major competitors include:
- PeopleSoft
- Cyborg
- Oracle

PeopleSoft (Pleasanton, CA) positions itself as the leading client/server HR vendor. Aggressive marketing, coupled with a well-designed user interface, has propelled its growth. It too offers development tools, but they are more like PC Windows development tools than CASE tools. They have less emphasis on BPR and more on cyclical development methods. PeopleSoft offers

financials and logistics software, unlike InPower.

Cyborg targets similar markets to InPower with a focus on HR solutions. Cyborg has a lower entry price and focuses less on customization. Cyborg is also stronger in established minicomputer accounts.

Oracle sells its HR solutions with its database and usually as part of an applications suite. Oracle's main focus is on systems software, although in the last year it has put more emphasis on its applications.

SAP is preferred by large multinationals, particularly in manufacturing that want an integrated HR, financial and manufacturing solution. SAP emphasizes support for different country's HR policies and targets large manufacturing multinationals.

Lawson Software provides midrange client/server HR solutions, but InPower typically serves installations that have a mainframe. Longer term Lawson could be a more serious competitor as InPower increases its market penetration.

9. Outlook

As a separate company, InPower can move faster than Integral to compete with Powersoft. Long term, InPower has the opportunity to outgrow Integral and be a highly successful venture. Short term, InPower will focus on HR. Long term it can be expected to add financials and other modules to support enterprise computing.

10. INPUT Assessment

InPower has experienced management that is experienced in selling and supporting HR

solutions. It knows how to balance customization and standard product development. It also knows when to rely on partners for professional services, like BPR, that it does not provide.

Exhibit 1

Management Strengths

- Focus on the HR client/server market
- Ability to balance service and product marketing
- InPower has a new management team with strong credentials and good track records

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InPower has acquired both senior marketing and development executives recently. This management team strengthening is likely to cause some instability as the company becomes established. These changes should be viewed positively as they will enable InPower to adapt from its mainframe heritage to faster moving client/server markets.

To grow fast, InPower management can be expected to raise additional capital. Bringing in new investors offers the company an opportunity to enhance its valuation, thereby energizing its employees.

Exhibit 2

Management Challenges

- Differentiate InPower from other HR vendors
- Manage the relationship with Integral
- Move fast
- Inject new capital and additional owners

InPower's software is most attractive to companies that want to reengineer their business processes when they purchase the software. Companies merely interested in

automating paperwork are unlikely to purchase from InPower. The InPower software architecture enables users to customize their applications, but it also enables system administrators to enforce security controls. For example, only certain users may be allowed to modify their software.

Exhibit 3

Product Strengths

- Supports business modeling
- Users can customize their systems
- Central IS can control security
- Modern, flexible architecture

InPower should consider having a low-end solution that can be sold by VARs and makes its solution more scalable. InPower is currently supporting leading server platforms from Sun, IBM and HP. The narrow range of platforms supported helps the company's profitability in the short term, but may hinder its ability to compete long term. To date it has been skilled at picking fast-growing leaders like HP and Oracle.

InPower needs to find innovative software developers that can augment its HR products. It is starting to attract information engineering consultants, but it needs to attract a wider range of VARs to enable it to support branch offices and smaller accounts. It also needs VARs that can add modules to its products, thereby broadening its product line.

Product differentiation is a concern. Currently InPower is differentiating itself from competitors with technology and ease-of-customization. Client/server is no longer a differentiator and a flexible architecture will not be one for long. InPower has a

marketing message that appeals to development staff and users wanting to customize applications. Long term InPower will need to differentiate itself based on the solutions it can provide to users. InPower needs to evolve more modules to broaden its product range.

Exhibit 4

Product Challenges

- Provide a lower entry price
- Support a wider range of platforms
- Attract third parties to add functionality
- Differentiation on user features

InPower can market more aggressively than its parent and focus its resources on new products. InPower needs to gain more mindshare and visibility like PeopleSoft. InPower plans to increase its promotional activities. These require a strong marketing message.

InPower risks being constrained by the size of its sales force. A strength of its direct sales strategy is that it provides close access to customers. However, a serious disadvantage is that it limits the ability of InPower to leverage its product sales through resellers.

Exhibit 5

Marketing Strengths

- Separation from legacy image of parent
- Professional service alliances
- Ownership of the customer

SAP promotes internationalization. InPower has the potential to be strong in Canada and the U.S. like Integral. To be a global player, InPower needs to increase its support for

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international accounts. It may also consider alliances and partners with regional HR vendors overseas.

Exhibit 6

Marketing Challenges

- Differentiation
- Broader alliances
- Indirect channel management
- Overseas support

InPower has an exciting opportunity to challenge vendors like PeopleSoft. To do this it must execute rapidly and reliably. It has the opportunity to leverage the Integral installed base and convert it to C/S systems.

This profile is issued as part of INPUT's Client/Server Software Program.
If you have questions or comments on this profile, please call your local INPUT organization or
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Acquisition/partnership searches

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